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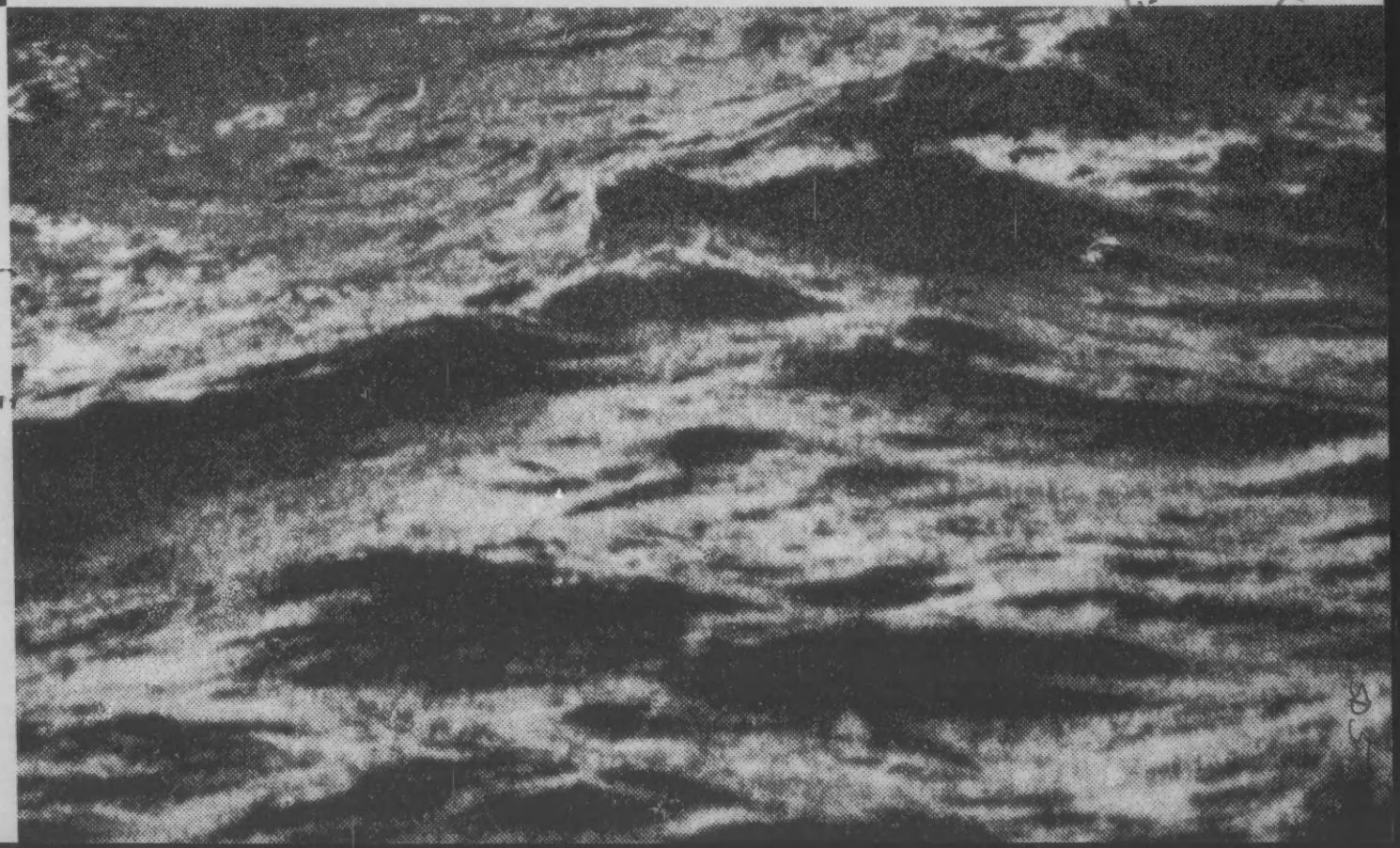

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UNITED STATES DEPARTMENT OF COMMERCE
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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 - Subscription price: $6.50 per year.

0.31 DISTRIBUTION OF TRANS-6-HEXADECENOIC AND OTHER FATTY ACIDS IN TISSUE AND ORGANS OF THE ATLANTIC LEATHERBACK TURTLE DERMOCHELYS CORIACEA CORIACEA L.

Ackman, R. C., S. N. Hooper, and J. C. Sipos (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
International Journal of Biochemistry 3, No. 14, 171-179 (Apr. 1972) (Scientechnica Publishers, Ltd., 42-44 Triangle West, Bristol, England BS8 1EX)

In previous work trans-6-hexadecenoic acid (t16:1ω10) was found to be a normal component of depot fat in three marine turtles including the leatherback.

Experiments on lipids in the fresh organs of a leatherback were performed to determine the distribution of t16:1ω10 acid, and to report details of other fatty acids in the tissue lipids.

The presence of trans-6-hexadecenoic acid was found in all samples tested. Some selectivity was indicated by incorporation of this compound into lipids of organs other than lung phospholipids. The authors suggest that the different proportions of t16:1ω10 acid relative to other C_{16} acids in various organs is due to different functional characteristics of phospholipids.

A total of 56 fatty acids and their percentage composition were determined from 10 organs of the leatherback turtle.

All phospholipids except those of the lung were enriched in arachidonic acid compared to the proportions of this acid in depot fat.

[3 tables, 20 references] SW

0.35 VISUAL PIGMENT OF THE COELACANTH

Dartnall, H. J. A. (MRC Vision Unit, University of Sussex, Falmer, Brighton, England)
Nature 239, No. 5371, 341,342 (Oct. 6, 1972)

[The eyes of most vertebrates contain two kinds of light receptor: rods, for vision in dim light; cones, for vision in bright light and color vision. The rods and cones contain a photosensitive pigment that bleaches on exposure to light. Some aspect of this process triggers a nervous excitation which, transmitted from neuron to neuron along optic pathways to the brain, ends in causing visual sensations.

Visual pigments contain vitamin A aldehyde bound as chromophore to a type of protein called opsin. Vitamin A aldehyde is also called retinal or retinaldehyde. Opsins combine with retinal to yield four pigments of vertebrate vision, one of which is rhodopsin. In rhodopsin the chromophore is found in a cis configuration of retinal, the 11-cis isomer. The only action of light in vision is to isomerize the chromophore of rhodopsin from the 11-cis configuration to all-trans configuration. In this reaction the structure of rhodopsin opens progressively, hydrolyzing finally to a mixture of opsin and all-trans retinal. Bleaching occurs in the progressive opening of the rhodopsin structure; and visual excitation must have occurred by this stage. Absorption spectra are used to characterize visual pigments. Abstractor's note]

A coelacanth was captured by native fishermen of the Comoro Islands [Moçambique Channel], on March 22, 1972. A quarter of one retina of the coelacanth

(over)

0.35 TROUT TESTIS CELLS. I. CHARACTERIZATION BY DEOXYRIBONUCLEIC ACID AND PROTEIN ANALYSIS OF CELLS SEPARATED BY VELOCITY SEDIMENTATION

Louie, Andrew J., and Gordon H. Dixon (Department of Biochemistry, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of Biological Chemistry 247, No. 17, 5490-5497 (Sept. 10, 1972)

Following hormonal induction of spermatogenesis, trout testis cells pass through various stages: (1) The generation of a large number of precursor germ cells; (2) reduction-division of the chromosome complement to give rise to spermatids; (3) the packaging of spermatid DNA; and (4) the development of propulsive organelles, and other structures required for penetration of the egg.

Experiments were performed to determine the DNA, RNA, histone, and protamine content of the cells at each stage. Trout testis cells at different stages of spermatogenesis were separated by velocity sedimentation on serum albumin gradients in an ultracentrifuge; the cells in each region of separation were identified according to sedimentation velocity constants (Sv).

Using radioisotope techniques the cells at each stage were subjected to determinations of DNA and RNA. Using gel electrophoresis and autoradiography techniques, determinations of specific distribution of histones and protamines in the different cell types were performed.

Early stage cells sediment in a broad band between 2.5 and 4.5 Sv. These cells actively synthesize DNA. In addition, only histones are present in cells that sediment at 2.8 to 3.5 Sv.

(over)

0.35 TROUT TESTIS CELLS. II. SYNTHESIS AND PHOSPHORYLATION OF HISTONES AND PROTAMINES IN DIFFERENT CELL TYPES

Louie, Andrew J., and Gordon H. Dixon (Department of Biochemistry, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of Biological Chemistry 247, No. 17, 5498-5505 (Sept. 10, 1972)

Trout testis cells were labeled with radioisotopes of arginine or lysine and inorganic phosphate. The cells (at different stages of development) were separated according to sedimentation velocity constants (Sv) in serum albumin gradients. The basic proteins from cells at each stage were separated and analyzed for radioactivity in starch gels.

The results indicate that most of the histones were synthesized and phosphorylated in diploid cells (cells having double the basic (or haploid) number of chromosomes) that sediment in the range of 2.8 to 3.5 Sv. Very little synthesis or phosphorylation of histone occurred in the spermatids (middle stage cells).

Protamine synthesis begins in spermatid cells; the protamine is extensively phosphorylated.

The cellular specificity of histone phosphorylation suggests that this process is not required for the progressive loss of histones during the transition of spermatids sedimenting at 1.55 Sv to spermatids sedimenting to 1.0 Sv.

[6 figures, 2 tables, 34 references] SW

0.35

eye was washed, shaken in 35% sucrose solution, and centrifuged. Final treatment consisted of extraction with 2% digitonin solution.

The absorbance spectrum of the extract showed that only a little pigment was present. After treatment with a neutral hydroxylamine solution, and exposure to white light for 15 min., the absorbance spectrum was examined again. It was found to be λmax. at 473 nm. and was based on retinal.

Earlier work reported that most deep-living fishes and deep-diving mammals have visual pigments with λmax. in the range 477-487. The coelacanth thus shares pigment spectral position with other deep-living fishes. The author suggests that under conditions where the light level is very low the best visual performance will be mediated by a visual pigment, the absorbance maximum of which coincides with the peak of the ambient light.

[1 figure, 18 references] SW

0.35 TROUT TESTIS CELLS. III. ACETYLATION OF HISTONES IN DIFFERENT CELL TYPES FROM DEVELOPING TROUT TESTIS

Candido, E. Peter M., and Gordon H. Dixon (Department of Biochemistry, University of British Columbia, Vancouver 8, British Columbia, Canada)
Journal of Biological Chemistry 247, No. 17, 5506-5510 (Sept. 10, 1972)

Trout testis cells at different stages of spermatogenesis were separated by velocity sedimentation; the cells in each region of sediment were identified according to sedimentation velocity constants (Sv). Radioactivity was measured after incubating treated cells with radioisotopes. Starch gel electrophoresis techniques were also used.

Acetylation was observed in the spermatocytes (early stages) and spermatids (middle stages) of testis cell development. In the spermatocytes, histone synthesis and extensive acetylation occurred. In the spermatids there was histone acetylation but very little synthesis. At this stage the histones are gradually removed and replaced by protamine. The authors suggest that acetylation, which loosens the tight bond of histones to DNA, is necessary before enzymatic degradation of histones can take place.

[7 figures, 1 table, 23 references] SW

0.32 PROSPECTS OF USING SWINE PANCREAS ENZYME PREPARATIONS FOR OBTAINING PROTEIN HYDROLYZATES (0.38)

Klemkas, I. (Rizh. Med. Inst., Riga, U.S.S.R.)
Chemical Abstracts 77, No. 5, 31240x (July 31, 1972)

0.36 LIPIDS OF COLD-WATER AND WARM-WATER PLANKTON-EATING FISH IN THE BLACK SEA

Lisovskaya, V. I. (U.S.S.R.)
Chemical Abstracts 76, No. 23, 138360t (June 5, 1972)

0.35 ISOLATION AND IDENTIFICATION OF CILIATINE (2-AMINOETHYLPHOSPHONIC ACID) FROM PHOSPHOLIPIDS OF THE OYSTER, CRASSOSTREA GIGAS

Tamari, Masato, and Masao Kametaka (Dept. of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 36, No. 7, 1147-1152 (July 1972)

Ciliatine [H_2N-CH_2-CH_2-$PO(OH)_2$] (a naturally occurring compound containing a carbon-phosphorus bond) has been isolated from the protozoan Tetrahymena pyriformis, fresh-water molluscs, terrestrial mammals, and marine animals in the phyla coelenterata, mollusca, and echinoderamata. The biochemical role of ciliatine and the mechanism of its synthesis by living organisms is not yet known. Bacteria are able to use the phosphorus of ciliatine; also, when the compound was added to the diet of rats it was incorporated in the liver lipids of the animals. Because ciliatine is incorporated into the tissues of animals, the authors are making a survey of the distribution of this phosphonic acid in Mollusca. The present paper reports on their examination of the oyster C. gigas.

Seventy-six mg. of ciliatine were isolated from 72 g. of lipids of the oyster by a combination of ion-exchange chromatographic techniques. The ciliatine was also found in the hydrolyzates of a chloroform-methanol insoluble fraction of the oyster.

The authors do not know whether the compound is synthesized by the oyster or is furnished to them by symbiotic algae (the zooxanthellae) associated with the oyster. The authors suggest that the fixation of phosphorus into a covalent linkage with a carbon residue may enable the animals containing such compounds to retain an adequate supply of phosphorus for phospholipid metabolism in a marine environment in which phosphorus can be limiting.

[1 figure, 2 tables, 15 references] FTP

0.35

In cells of middle stage testis, a peak of sedimentation occurs at 1.5 Sv. A later stage appears as a shoulder on this peak where sedimentation occurs at 1.0 Sv. Cells at 1.5 to 1.0 Sv synthesize very little DNA; furthermore, histones and protamines are present in these cells. In mature sperm cells (which sediment at 0.6 Sv) only protamine is found.

[4 figures, 3 tables, 32 references] SW

0.31 FATTY ACID COMPOSITION OF THE FATTY OIL OF CHILEAN ANCHOVY (ENGRAULIS RINGENS) AND ITS NEUTRAL AND POLAR FRACTIONS

Burgos Coderch, Maria T. (Chile)
Chemical Abstracts 76, No. 23, 139216n (June 5, 1972)

0.38 PROTEASE FORMATION BY A MARINE PSYCHROPHILIC BACTERIUM

Kato, Nobuo, Toru Nagasawa, Yoshiki Tani, and Koichi Ogata (Dept. of Agricultural Chemistry, Kyoto University, Kyoto, Japan)
Agricultural and Biological Chemistry 36, No. 7, 1177-1184 (July 1972)

Many psychrophilic bacteria from marine and terrestrial origin produce proteases in culture fluid. During the course of a study of the physiological characteristics of psychrophilic bacteria, the authors found that the marine psychrophilic bacterium Pseudomonas sp. strain No. 548 showed the highest proteolytic activity of the organisms examined. The characteristics of this particular bacterium, its production of protease, and the characteristics of the protease are being studied and will be reported in a series of papers. The present paper, the first in the series, reports on the effects of cultural conditions on the production of protease by the marine psychrophilic bacterium, Pseudomonas sp. No. 548.

The Pseudomonas sp. required salts of sea water to grow and to produce protease; optimum temperature for growth was 20° C. Protease formation was greatest at 5° C. and decreased with increasing temperature. Two components of the protease system having proteolytic activity were isolated by means of chromatography with DEAE-cellulose. The activity ratio of fraction I to fraction II increased as the temperature was increased.
[4 figures, 8 tables, 22 references] FTP

0.38 ISOLATION AND CHARACTERIZATION OF PANCREATIC PROCARBOXYPEPTIDASE B AND CARBOXYPEPTIDASE B OF THE AFRICAN LUNGFISH

Reeck, Gerald R., and Hans Neurath (Dept. of Biochemistry, University of Washington, Seattle, WA 98195)
Biochemistry 11, No. 21, 3947-3955 (Oct. 10, 1972)

As part of a study of the phylogenetic variations of the structure and function of certain proteases, the authors examined the pancreatic zymogens and enzymes of the African lungfish Protopterus aethiopicus. This information contributes to the body of knowledge of the evolutionary patterns of pancreatic proteases.

The procarboxypeptidase B of the African lungfish was purified by a combination of ion-exchange chromatography, affinity chromatography, and gel filtration, and was characterized. The monomeric zymogen has a molecular weight of 45,000 and has an amino-acid composition similar to procarboxypeptidases B of other species. The amino-acid sequence of the amino-terminal portion of procarboxypeptidase is Glu-Pro-Thr-Pro-Arg-Ser-Phe-Asn-Gly-Asp-Lys-Val-Phe-Arg-Val. The zymogen shows intrinsic peptidase and esterase activities that increase markedly by activation with trypsin. The activation reaction proceeds via an intermediate. Carboxypeptidase B shows extensive similarities to the corresponding bovine, porcine, dogfish, and rat enzymes. The amino-terminal sequence of the carboxypeptidase of the African lungfish is homologous to those of carboxypeptidases A and B of bovine.
[9 figures, 4 tables, 22 references] FTP

0.39 VOLATILE AMINES IN MOUSE BRAIN: A RADIOASSAY WITH PICOGRAM SENSITIVITY

Nixon, Ralph (Department of Neuropathology, Harvard Medical School, Boston, MA 02115)
Analytical Biochemistry 48, No. 2, 460-470 (Aug. 1972)

The volatile amines piperidine and pyrrolidine have potent neuropharmacological properties. The presence of these amines has been demonstrated in brain. Other volatile amines also are found in higher concentrations in brain than in other tissues.

Further study of volatile amines required the development of a more sensitive assay. Current colorimetric techniques were sensitive to 1 μg. of amine; however, certain amines required as much as 20 to 30 g. of tissue for analysis. Thus, analysis of individual brain regions, or the brain of small animals, was not feasible by these methods.

A separation technique and radioassay for volatile amines was developed which is 500 times more sensitive than any available method. The sensitivity limits of this method lie in the picogram range. Pooled brains of three mice were homogenized in cold TCA reagent consisting of trichloroacetic acid containing sodium metabisulfite (NaS_2O_5) and disodium ethylenediaminotetraacetate (EDTA). The homogenate was extracted by means of centrifugation and resuspension. The extract in TCA was steam distilled at pH 11 and the distillate was collected in a solution containing NaS_2O_5 and EDTA. The distillate was dried under reduced pressure, redissolved in ethanol, evaporated, and redissolved in ethanol. The solution was then titrated to pH 7.3. The solution was reacted with the radioactive isotope of 2,4-dinitrofluorobenzene (^{3}H-DNFB) to form radioactive diphenylamine derivatives which were then
(over)

0.39 (9.19) POLYCHLORINATED BIPHENYLS: METABOLIC BEHAVIOR OF PURE ISOMERS IN PIGEONS, RATS, AND BROOK TROUT

Hutzinger, O., D. M. Nash, S. Safe (Atlantic Regional Laboratory, National Research Council of Canada, Halifax, Nova Scotia, Canada), A. S. W. DeFreitas, R. J. Norstrom, D. J. Wildish, and V. Zitko
Science 178, No. 4058, 312-314 (Oct. 20, 1972)

Polychlorinated biphenyls (PCBs) are now known to be widespread pollutants, and they are considered to be resistant to chemical and biological degradation. Reports from previous studies indicated that chemical changes to chlorinated biphenyls were brought about by ultraviolet light; in addition, components of lower chlorine content in PCBs were metabolized by rats, pigeons, and Japanese quail but not by fish.

Experiments were performed on laboratory rats, pigeons, and brook trout to determine species differences in metabolic behavior of commercial PCB preparations.

The preparations included 4-chlorobiphenyl, 4,4′-dichlorobiphenyl, 2,2′,5,5′-tetrachlorobiphenyl, and 2,2′,4,4′,5,5′-hexachlorobiphenyl. Groups of young male rats received intraperitoneally 50 mg. of a PCB per kg. of body weight each day for 3 days. The pigeons received, in capsules, the equivalent of 60 to 100 mg./kg. each day for 3 days. Each brook trout received in a single dose the equivalent of 0.460 to 1.2 g./kg. concealed in chunks of beef liver.

One week from the start of the experiment excreta from the pigeons and rats were collected. The water in which the trout had been kept for 4 days was concentrated to 1 liter. Urine was acid hydrolyzed by refluxing and extracted with
(over)

0.4 (9.19) RELATION OF TRACE METALS TO HUMAN HEALTH

Schroeder, Henry A. (Dept. of Physiology, Dartmouth Medical School, Hanover, NH 03755), and Dan K. Darrow (Trace Element Laboratory, Dept. of Physiology, Brattleboro, Vt.)
Environmental Affairs 2, No. 1, 222-236 (Spring 1972) (Environmental Law Center, Boston College Law School, Brighton, MA 02135)

The authors review the effects of various trace elements on human health in light of animal industrial consumptions, natural abundances, and changes in experimental animals fed low doses for life.

Fourteen metals and two nonmetals are essential for life or for health of animals; twelve of these are mined in large amounts, are abundant in the earth's crust, and are found in human tissues in sizeable quantities. Most of the metals are not toxic to mammals in ordinary concentrations. Five of these metals occur in low amounts, are consumed industrially in sizeable amounts, occur in the body of man, and are toxic of themselves. Of these five metals, lead and cadmium are prevalent in man. Nine metals show low orders of toxicity and they occur in low amounts in the earth's crust. Eight of the metals have little or no toxicity, and six of these eight are abundant.

The metals in the environment that may be of potential hazard to man are: lead (by far the greatest pollutant), cadmium (influences hypertension and emphysema), nickel (as the carbonyl which is carcinogenic), antimony (is toxic), beryllium (can cause beryllosis), and methyl mercury (is highly toxic). The authors indicate that at present levels of exposure, lead, cadmium, and possibly nickel are potentially hazardous to health.
[48 references] FTP

0.36 BINDING AND ADENOSINE TRIPHOSPHATASE OF FLAGELLAR PROTEINS FROM SEA URCHIN SPERM

Hayashi, Masao, and Sugie Higashi-Fujime (Institute of Molecular Biology, Faculty of Science, Nagoya University, Chikusa-ku, Nagoya, Japan)
Biochemistry 11, No. 16, 2977-2982 (Aug. 1, 1972)

In earlier work, the protein "dynein" was isolated from cilia of Tetrahymena and found to have adenosine triphosphatase (ATPase) activity. (Tetrahymena is a common genus of ciliated protozoa.) [Cilia are short, hairlike living processes, usually numerous, on a protozoan cell. Cilia are capable of beating in unison and producing locomotion. Each cilium consists of two central fibrils (thread-like parts of a cell) surrounded by a ring of nine fibrils which are enveloped in a thin membrane. Abstractor's note]

Dynein was identified as the arm projecting on the outer fibril of cilia and found to rebind specifically to the outer fibril. Cilia which rebound dynein showed the superprecipitationlike phenomenon by the addition of ATP. The authors suggest that the biochemical analysis of the interaction between dynein and the outer fibril will give the basis for understanding the mechanism of beating of cilia and flagella. Studies were performed with this viewpoint, using flagella from sea urchin sperm.

Results indicated that solubilized dynein can rebind to the outer fibrils. When binding occurs, the ATPase activity of dynein is characteristically changed. There are differences between free dynein and bound dynein on the K^+ ion dependence of Ca-activated ATPase and the inhibition by the substrate ATP. The authors suggest that this activity corresponds to the effect of F-actin on the ATPase activity of myosin A from muscle and plasmodium.
[9 figures, 1 table, 18 references] SW

0.39 (9.19)

ether. Feces from the rats were extracted with hexane. Pigeon excreta was hydrolyzed and extracted. The liter of trout water was acidified, refluxed, and extracted with ether.

By means of thin layer and gas chromatography and mass spectrometry samples of excreta extracts were analyzed. The results showed that mammalian metabolism (through hydroxylation) of chlorobiphenyls becomes more difficult as the number of chlorine atoms increased in the molecule; that is, 4-chloro-, 4,4′-dichloro, and 2,2′,5,5′-tetrachlorobiphenyl isomers were converted to mono and dihydroxylated derivatives by the rat, but no hydroxylated products of the hexachlorobiphenyl (2,2′,4,4′,5,5′) were detected. Pigeon metabolism of these compounds was similar except that no dihydroxychlorobiphenyl was found in excreta from birds fed 4-chlorobiphenyl. There was no evidence that brook trout had metabolized PCBs by hydroxylation.
[1 figure, 1 table, 9 references] SW

0.39 TRYPSIN-PLASMIN INHIBITORS FROM LEECHES. ISOLATION, AMINO ACID COMPOSITION, INHIBITORY CHARACTERISTICS

Fritz, Hans, Maria Gebhardt, Renate Meister, and Edwin Fink (Inst. Klin. Chem., Univ. Muenchen, Munich, Germany)
Chemical Abstracts 76, No. 9, 43315f (Feb. 28, 1972)

0.35 (2.02) A SIMPLE METHOD FOR FOLLOWING RIGOR MORTIS DEVELOPMENT IN BEEF AND POULTRY MEAT

Kahn, A. W., and A. R. Frey
Can. Inst. Fd Technol. J. 4, No. 4, 139-142 (1971)
BFMIRA Abstracts 25, No. 3, Abstract No. 769, 157 (Mar. 1972)

The method described is based on the measurement of postmortem conversion of adenosine nucleotides to inosinic acid, and involves calculation of a ratio of absorbance at 258mμ to that at 250 mμ which changes linearly with the ratio of adenosine and inosine nucleotides. The method is said to be suitable for routine determination of the onset of rigor mortis and to have the advantages of being accurate but simple enough to allow analysis of a large number of samples. S.M.S.
Reprinted

0.39

separated by thin-layer chromatography. The material on the delimited spots was scraped into scintillator vials. Scintillation fluid was added, the vials were shaken, and counting was carried out. Standard amine curves were constructed and concentrations of amines in experimental samples were determined from the curves.

The method has been used to measure the concentration of seven volatile amines simultaneously from samples of treated mouse brain.
[2 figures, 3 tables, 21 references] SW

0.4 (1.82) PHAGOCYTOSIS IN INVERTEBRATES. II. THE CLEARANCE OF CARBON PARTICLES BY THE CLAM TRIDACNA MAXIMA

Reade, Peter, and Ene Reade (Dept. of Dental Medicine and Surgery and Dept. of Microbiology, University of Melbourne, Parkville, Victoria, Australia, 3052)
Journal of the Reticuloendothelial Society 12, No. 4, 349-360 (Oct. 1972)

In the vertebrates immunoglobins function, at least toward particulate antigens, as opsonins, for the purpose of facilitating uptake of foreign material by macrophages. These cells engulf and most often digest the foreign material, destroying susceptible microorganisms and stimulating lymphocytes to increased production of specific immunoglobins.

Proteins displaying some of the properties of antibody, such as hemagglutination, do occur in the hemolymph of invertebrates, including molluscs, and some of these exhibit high specificity. Characterization of these proteins, however, show that they are structurally different from mammalian immunoglobins.

Invertebrate animals appear to rely on macrophages without the extra refinement of a lymphoid system and its immunoglobin products. The authors report a suggestion from earlier work that as yet unidentified humoral factors in invertebrates may act as finely descriminating recognition factors.

The clam T. maxima, a coral attached bivalve of the Great Barrier Reef, was examined for the presence of phagocytic cells with the ability to engulf intravascularly distributed carbon particles. By histological techniques it was demonstrated that the particles spread rapidly through the circulatory system. It was also demonstrated that the phagocytic cells, circulating in the hemolymph, were exclusively responsible for the uptake of the particles and their eventual

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0.5 (9.19) SALMONELLAE AND EDWARDSIELLA TARDA IN GULL FECES: A SOURCE OF CONTAMINATION IN FISH PROCESSING PLANTS

Berg, R. W., and A. W. Anderson (Dept. of Microbiology, Oregon State University, Corvallis, OR 97331)
Applied Microbiology 24, No. 3, 501-503 (Sept. 1972)

The incidence for human salmonellosis from foods is usually associated with foods of animal origin. Fish meal has been implicated as a source of Salmonella; however, fish products prepared for human consumption appear to be less of a problem than products prepared for animal feed. The purpose of the present study was to determine the importance of gulls as a reservoir of and potential source of infection by Salmonella and E. tarda in seafood and fishmeal processing plants. E. tarda is capable of producing disease patterns similar to those caused by Salmonella. Five hundred and twenty-one fecal specimens were obtained from various areas along the Oregon coast.

Of the 521 gull fecal samples, 13 (2.5%) contained Salmonella (2.1%) or E. tarda (0.4%). None of the areas sampled had a high infection rate. However, the organisms showed wide distribution along the coast of Oregon, and this indicates that they may have a role in the epidemiology of salmonellosis.

[1 table, 12 references] FTP

0.5 (8.8) BACTERIOLOGICAL QUALITY AND OCCURRENCE OF VIBRIOS IN DUNGENESS CRABMEAT IN OREGON PROCESSING PLANTS AND MARKETS

Allen, Evelyn C. (Clatsop Community College, Astoria, OR 97103), and Margy Woodburn (Dept. of Foods and Nutrition and Home Economics Research, Oregon State university, Corvallis, OR 97331)
Journal of Milk and Food Technology 35, No. 9, 540-543 (Sept. 1972)

Food microbiologists and public health officials have become interested in Vibrio parahaemolyticus as a cause of food poisoning. In Japan, it causes 40 to 70% of all bacterial outbreaks of food poisoning. It was identified as the cause in a Maryland outbreak in 1971. Results of other work indicated that V. parahaemolyticus was found in fish and shellfish in Japan, in shellfish along the Atlantic coast, and in shellfish from Bellingham Bay in Washington State.

Crab samples from Oregon retail markets and from various points along crab processing lines of Oregon packers were analyzed to determine the occurrence of the organism. Numbers of fecal streptococci and aerobic total plate counts were also obtained to assess the bacteriological quality of the crabmeat.

Of 106 samples from either source only one, a raw sample, gave an isolate which biochemically resembled V. parahaemolyticus. Eight other isolates were positive for other halophilic vibrios.

Fecal streptococci in crabmeat from processors and retail markets were generally within the guideline of less than 1,000 organisms per gram of crabmeat. The median aerobic total plant count of 1.2×10^6 organisms per gram of samples

(over)

0.5 VIBRIO PARAHAEMOLYTICUS GASTROENTERITIS IN MARYLAND: LABORATORY ASPECTS

Molenda, John R., William G. Johnson, Morris Fishbein, Barry Wentz, Ira J. Mehlman, and Thoburn A. Dadisman, Jr. (Laboratory and Research Administration, Maryland State Dept. of Health and Mental Hygiene, Baltimore, MD 21218; Division of Microbiology, FDA, Washington, DC 20201; and Field Service Branch, Epidemiology Program, Center for Disease Control, Atlanta, GA 30333)
Applied Microbiology 24, No. 3, 444-448 (Sept. 1972)

Three food-associated outbreaks of gastroenteritis occurred in Maryland in September 1971. Apparently two outbreaks involved steamed crabs and one involved crab salad. Laboratory data on the isolation and identification of V. parahaemolyticus from the persons and foods involved in these outbreaks are described in this article. The results reported constitute the first confirmed foodborne epidemics due to V. parahaemolyticus in the United States. This paper also describes the methods for the isolation and identification of the organism and includes a procedure for the simple conversion of conventional laboratory media into suitable culture media for this facultatively halophilic organism.

[1 table, 29 references] FTP

0.5 (8.8)

from retail markets was above the limit of 100,000 established by New York City and used elsewhere. The plate count of to-be-packed crabmeat remained within this limit.
[2 tables, 19 references] SW

SW

nute in nutrition of the organism is its source.
[2 tables, 19 references]

the absence of assistance. The batchors suggest that the stimulatory role of arg-
into the cell procedure at a rate which was two to three times more than in
mosome caused incorporation of ^{14}C-labeled amino acid
^{14}C-labeled medium containing
The omission of arginine from the chemically defined medium results in an al-
Addition of arginine to an in-
A. salmonicida.

0.4 (1.82)

elimination by cellular migration across epithelial barriers. The migrating cells containing the carbon particles, once through the epithelium, are then eliminated to the outside via the exhalant siphon.
The authors suggest that the macrophages of invertebrates also produce their own recognition substances, which can be detected free in their hemolymph. The identity and source of these substances are not known.
[5 figures, 19 references] SW

0.5

INDUCIBLE PHAGE TAIL-LIKE PARTICLES OF CLOSTRIDIUM SACCHAROPERBUTYLACETONICUM AND ITS RELATED STRAINS

Ogata, Seiya, Osamu Mihara, Yoshifumi Ikeda, and Motoyoshi Hongo (Laboratory of Applied Microbiology, Dept. of Agricultural Chemistry, Kyushu University, Fukuoka, Japan)
Agricultural and Biological Chemistry 36, No. 8, 1413-1421 (Aug. 1972)

Bacteriocins are bacteriocidal agents produced by many species of bacteria. They are divided into two groups: one, low molecular weight; the other, high. The high molecular weight group is sedimentable and visible in the electron microscope as phagelike particles. Experiments were performed on the induction, isolation, and morphology of these substances, and the isolation of bacteria that were sensitive to them.
The results of the experiments indicated that two new kinds of high molecular bacteriocin, named O and M, were found in C. saccharoperbutylacetonicum and its related strains. Production of both substances was inducible by mitomycin C (MC) or ultraviolet light. The clostocins appeared in the bacterial cells at about 105 min. after MC treatment, increased rapidly during the next 75 min. and were released into the medium upon cell lysis. The lysis of O and M producing cells was observed at 3.5 hr. and 4 hr., respectively, after MC treatment.
Clostocin O killed M-producing strains, and clostocin M killed O-producing strains. Electron microscopic observation showed that these clostocins were phage taillike particles with a contractile sheath around a core. The particles resembled some pyocins and also resembled the tail of phage HM 3 of C. saccharoperbutylacetonicum. In addition, M-producing strains of the organism had the ability to produce low molecular weight bacteriocin named clostocin D.
[9 figures, 4 tables, 30 references] SW

0.5 (9.19)

ENVIRONMENTAL FACTORS CORRELATED WITH SIZE OF BACTERIAL POPULATIONS IN A POLLUTED STREAM

Brasfield, Helen (Biology Dept., New Mexico Highlands University, Las Vegas, NM 87701)
Applied Microbiology 24, No. 3, 349-352 (Sept. 1972)

The purpose of this study was to examine the quantitative correlation, if any, between the bacterial quality of a stream and its chemical and physical parameters. Specifically, the author attempted to test the hypothesis that the numbers of bacteria (total, coliforms, and fecal streptococci) in a stream are correlated positively with the temperature, pH, levels of detergents, nitrate plus nitrite nitrogen, sulfate, chloride, bicarbonate, and phosphate.
The Gallinas River, San Miguel County, N. Mex., was selected as the test stream. Analyses were performed on samples of water taken twice weekly--March 12 through July 2, 1971--from a polluted zone of the river.
Log total bacteria correlated positively with levels of bicarbonate, phosphate, and detergent. Log coliform counts correlated positively with levels of phosphate and sulfate, but correlated negatively with levels of chloride. Log fecal streptococci counts correlated positively with concentrations of bicarbonate and chloride. Additional basic studies are needed for a more complete understanding of the problems, but these data do indicate the direction for future research. [2 tables, 14 references] FTP

0.5

INCORPORATION OF [^{14}C]DIAMINO-ACIDS BY A FISH PARASITE, AEROMONAS SALMONICIDA

Stuhr, H. S., and B. H. Reddy (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
International Journal of Biochemistry 3, No. 14, 167-170 (Apr. 1972)

The causative agent of furunculosis in salmonids is A. salmonicida. It has caused severe losses in salmonid stocks throughout North America and Europe. The pleomorphism requires arginine for growth; experiments were performed to determine the role of arginine in its nutrition.

0.5

INFLUENCE OF SALTS ON THE VIBRIOSTATIC ACTION OF 2,4-DIAMINO-6,7-DIISOPROPYL PTERIDINE

Merkel, Joseph R. (Dept. Chem., Lehigh Univ., Bethlehem, Pa.)
Chemical Abstracts 76, No. 23, 139296c (June 5, 1972)

0.6 (0.5) CONTROL OF CLOSTRIDIUM BOTULINUM AND STAPHYLOCOCCUS AUREUS IN SEMI-PRESERVED MEAT PRODUCTS

Riemann, Hans, W. H. Lee, and C. Genigeorgis (Dept. of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California, Davis, CA 95616)
Journal of Milk and Food Technology 35, No. 9, 514-523 (Sept. 1972)

Mildly processed cured meat products are frequently involved in food poisoning, the causative agent often being S. aureus, which can grow in a salt-containing environment. Other agents of food poisoning such as Salmonella, C. perfringens, and C. botulinum are seldom involved in poisoning due to ingestion of semi-preserved meat. C. botulinum can grow in incompletely preserved products and produce a toxin that causes a high mortality rate. Since even small outbreaks cause great alarm, food processing and distribution must be designed to exclude growth of this organism. The authors summarized a number of studies on botulinogenic foods, including semipreserved meat products.

C. botulinum and S. aureus are naturally occurring contaminants in semipreserved meat products. The organisms can be inhibited by storage below 3° C., 10% sodium chloride, pH values below 4.5, or proper combinations of these factors. Most meat products do not have the low pH and brine concentration required to inhibit, and there is always the risk of temperature abuse.

An approach to safety is to add, together with glucose, a radiation-killed preparation of lactic acid bacteria, such as Pediococcus cerevisiae. Such preparations cause a rapid decline in pH only when the product is exposed to high temperature; they are otherwise stable in the conditions found in meat storage.

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1.0116 (1.0117) FOREIGN FISHING

Fuss, Charles M., Jr. (Southeast Region, National Marine Fisheries Service, NOAA, St. Petersburg, Fla.)
Fish Boat 17, No. 9, 33, 35, 37, 47-48 (Sept. 1972)

Foreign vessels can legally fish off the coasts of the United States 12 miles offshore. U.S. nationals are granted exclusive rights to fish the contiguous sea from 3 miles offshore to 12 miles offshore. Only under certain international agreements are foreign fishing vessels allowed to fish in this zone.

Rapid expansion of foreign fishing off the U.S. coasts has occurred in the last decade. Foreign fishing fleets off the New England and Pacific Northwest coasts are well known and have caused concern. Much less is known about foreign fishing in the Gulf of Mexico and off the coast of the South Atlantic States.

The National Marine Fisheries Service (NMFS) performed a preliminary study to determine the extent of foreign fishing in that area in cooperation with the U.S. Coast Guard and the various state conservation agencies. The need for a permanent surveillance program was demonstrated by the study and an Enforcement and Surveillance Division was established in the Southeast Region of the NMFS in 1971. The area covered includes the Atlantic coastal waters from the mouth of Chesapeake Bay south and Gulf coastal waters from Florida to the Mexican border.

Personnel of the NMFS observed 386 individual foreign fishing vessels fishing in the area between October 1970 and October 1971. The vessels were from the U.S.S.R., Cuba, Mexico, Japan, East Germany, Bulgaria, Poland, and Spain. Of this total, 241 vessels were fishing in the Atlantic Ocean and the remainder in the

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0.6 (0.8) NUTRITIONAL CHARACTERISTICS OF MARINE FOOD FISH CARCASS WASTE AND MACHINE-SEPARATED FLESH

Crawford, David L., Duncan K. Law, and Jerry K. Babbitt (Dept. of Food Science and Technology, Oregon State University, Seafoods Laboratory, Astoria, OR 97103)
Journal of Agricultural and Food Chemistry 20, No. 5, 1048-1051 (Sept.-Oct. 1972)

The carcasses of each of six species of marine food fish were passed through a laboratory model flesh separator. The machine separated the waste into two fractions; flesh and bones-skin. The yields of the two fractions for each species of fish were determined. The proximate composition and mineral (P, K, Ca, Mg, Na, Ca/P, K/Na, Al, Ba, Fe, Sr, B, Cu, Zn, Mn, and Cr) contents of the whole waste, and machine separated flesh and bone-skin were analyzed. Also the PER (protein efficiency ratio) values for the whole carcass waste and the machine separated flesh were determined. The purpose of the study was to find out what yield of fish flesh could be produced from fish carcasses by use of a machine separator and to determine the effect of such machine separation on the composition and nutritional characteristics of the separated fractions. The six species of fish used were English sole, petrale sole, orange rockfish, yellowtail rockfish, true cod, and ling cod.

The yields of fish flesh from the carcass wastes ranged from 48.9% to 60.2%; these yields resulted in 43.7% to 55.3% recovery of protein, 42.7% to 66.0% recovery of fat, and 13.3% to 21.6% recovery of ash. The levels of phosphorus, calcium, strontium, manganese, boron, and chromium (generally associated with the bone and skin) were much lower in the recovered flesh fractions as compared to

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1.0146 (1.69) THE MOVEMENTS OF TAGGED ADULT PLAICE IN THE IRISH SEA

Macer, C. T. (Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, England)
Fishery Investigations, Series II, 27, No. 6, i-v, 35 pp. (1972). London, England Her Majesty's Stationary Office £1.05.

As a result of earlier work it is now known that the main spawning areas of plaice are off St. Bees Head, off Douglas (Isle of Man), off Great Ormes Head (North Wales), in Caernarvon Bay, and in the Bristol Channel.

Although movements of plaice in the Irish Sea were known, more information was needed to determine whether hatchery plaice would remain in the area where they were released. A total of 16,771 plaice (measuring 18 to 40 cm.) were tagged and released off the following areas: St. Bees Head (Cumberland), Great Ormes Head, Red Wharf Bay (North Wales), Caernarvon Bay, Cardigan Bay, and Bristol Channel. The mean recapture rate was 28%. Plaice in spawning condition that had been released off St. Bees Head, and Great Ormes Head mostly returned to the same area to spawn each year. Although they dispersed throughout the northeast Irish Sea after spawning, very few were recaptured outside this region.

Half the recaptures from a mixed population of tagged mature and immature plaice released in Red Wharf Bay in autumn were from outside the northeast Irish Sea, and they showed a marked tendency to migrate southwards.

There was evidence of homing at spawning time among plaice released on the spawning grounds in Cardigan Bay and the Bristol Channel, and for a predominantly

(over)

0.6 (0.8)

the carcass wastes. The levels of potassium, sodium, and iron were higher in the flesh fractions than the carcass wastes; but the calcium/phosphorus and potassium/sodium ratios were lower in the flesh fractions. The PER values for the flesh fractions were significantly higher than that of the carcass wastes.
[4 tables, 15 references] FTP

1.0146 (1.69)

northwards dispersal after spawning. There was no common migration pattern shown by plaice tagged outside the spawning season in Caernarvon and Cardigan Bays, but the predominant direction of movement was normally southwards. There were recaptures in the western English Channel from all release areas but there appeared to be very little return movement.
[12 figures, 13 tables, 17 references] SW

1.01 ATLAS OF THE LIVING RESOURCES OF THE SEAS

Prepared by the Dept. of Fisheries, Food and Agriculture Organization of the United Nations; via delle Terme di Caracalla, Rome, Italy (1972), viii + 19 pp. + 52 maps. Price not stated.

This atlas was prepared at the request of the United Nations Committee on the Peaceful Uses of the Sea-Bed and the Ocean Floor Beyond the Limits of National Jurisdiction. It depicts the living resources of the seas on a worldwide scale. Ten maps illustrate the geographical distribution and present state of exploitation of the resources living in the world's oceans. Seven maps show some characteristics of fish migration. Forty-five regional maps illustrate the geographical and vertical distribution and abundance of the main stocks of living resources in each ocean region. FTP

1.0116 (1.0117)

Gulf of Mexico. An estimated 100 million pounds of fish and shrimp were caught with a value of $7 million. The principal catch in the Atlantic Ocean was of mackerel and herring; in the Gulf of Mexico, the catch consisted of higher value shrimp, snapper, and tuna.

The Soviet Bloc fishing effort is an extension of the current herring and mackerel fishery that began off New England in 1961.

Japanese longliners were observed fishing mainly for albacore tuna off the North Carolina coast. They remained for 10 days and fished from 21 to 85 nautical miles offshore. The Japanese fish under an agreement achieved at the Rio Conference on Tuna in 1966. An informal understanding exists in which the Japanese remain a circumspect distance from areas of interest to U.S. sport fishermen.

Cuban fishing efforts in the eastern Gulf have increased; they fish for snappers and groupers. Cubans trawl for shrimp on the Tortugas grounds.

Japanese longliners fish for tuna in the north and western Gulf. The informal agreement of the Rio Conference also applies to this area.

Reports indicated that 50 to 200 Mexican shrimp trawlers were operating off the coast. Mexican fishermen are allowed to fish in the outer 3 miles of the U.S. contiguous zone under terms of a fishery agreement in force from January 1968 to January 1973.

MS [8pdg&photd 4]

0.6 AMOUNT AND COMPOSITION OF THE DRIP LIQUID FORMED DURING HEAT TREATMENT OF SARDINES AND TUNA AND POSSIBILITY OF ITS USE

Perovic, V., and M. Knezevic (Centar Ribu Privredu Mediterana, Prehrambeno-Tehnol. Inst., Zadar, Yugoslavia)
Chemical Abstracts 76, No. 25, 152157p (June 19, 1972)

0.6 (0.5)

(Addition of irradiated lactic acid bacteria to meat products has not yet been approved.)

Another way to improve safety of semipreserved meat is to add just enough glucono-delta-lactone to reduce the initial pH to a level at which the salt concentration is inhibitory. Larger amounts may result in flavor and color problems.
[5 figures, 1 table, 106 references] SW

0.7 (7.594) THE LIMITATIONS OF WHOLE TISSUE ANALYSIS TO DEFINE LINOLENIC ACID DEFICIENCY

Crawford, M. A., and A. J. Sinclair (Nuffield Institute of Comparative Medicine, The Zoological Society of London, Regents Park, London, N.W.1, England)
Journal of Nutrition 102, No. 10, 1315-1321 (Oct. 1972)

It has been claimed on the basis of a deficient diet and on whole head, liver and heart analysis, that linolenic acid is not essential to the rat (J. Nutr. 101: 937, 1971). The present studies show that the methodology was inadequate to support this conclusion. Analytical data are presented which illustrate the principle that whole tissue analysis need not define the content of linolenic acid metabolites in cell membrane phosphoglycerides. In particular, rat brain ethanolamine phosphoglycerides (EPG) contained 22% of their fatty acids as C22:6,n-3 but the contribution of brain EPG to the total head lipid was only 1.5%. It was estimated that analysis of total head fatty acids could not be used as evidence of deficiency of linolenate metabolites in brain EPG.
[3 tables, 22 references] Authors' abstract

1.89 (1.0114) SEA URCHINS: A NEW FISHERY DEVELOPS IN CALIFORNIA

Kato, Susumu (Tiburon Fisheries Laboratory, National Marine Fisheries Service, Tiburon, CA 94920)
Marine Fisheries Review 34, Nos. 9-10, 23-30 (Sept.-Oct. 1972) (formerly Commercial Fisheries Review; 3300 Whitehaven St., N.W., Washington, DC 20007)

In southern California, large numbers of sea urchins have long plagued the marine plant and animal community. Researchers have found a direct cause-and-effect relationship between the superabundance of sea urchins and the failure of underwater plants to proliferate. Sea urchins feed on seaweed and young kelp and sometimes even destroy mature kelp by feeding on the "hold fasts" that anchor them to the bottom.

Kelp and other seaweeds provide food and shelter for many species of invertebrates and fishes, and marine anglers take advantage of the concentrations of game fish often found in densely forested kelp beds. In addition to their ecological importance, kelp is a useful ingredient in a wide variety of industrial products, such as ice cream, beer, antibiotics, dyes, and welding rods. In California, about 150,000 tons of kelp are harvested annually.

Because of the harmful effect of sea urchins on kelp and, indirectly, on fishes and invertebrates, researchers started an eradication program several years ago to control sea urchin populations. Soon kelp harvesters and sport fishermen joined in the effort to destroy sea urchins. The eradication program appears to have resulted in speedy restoration of some kelp beds in southern California that had been in poor condition.

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2.1128 (2.1478) SCALLOP DREDGING GEAR AND METHODS

Hughes, W. D. (Dept. of Primary Industry, Canberra, Australia)
Australian Fisheries 31, No. 7, 12-15 (July 1972)

Presently all the States of Australia conduct scallop fishing, but Victoria is preeminent. Therefore the various methods and types of gear employed in scallop dredging in the Victoria area are surveyed.

Boats vary from 30 to 69 ft. in length and from 70 to 200 hp. in engine size. Wheelhouses may be either forward or aft, however the aft position is quite inconvenient. There is little uniformity in boat design since many of them were originally employed in other fisheries. The one item all scallop boats have in common is a dredge self-tipping device mounted on the stern. This tips the dredge up at an angle as it comes on board the boat and forces it to empty itself with little or no assistance from the crew.

Most winches were found to be modified heavy truck differentials; some with two speeds. Occasionally, two drums are used and arranged so that one can be locked while the other is free running. Dredge hauling speed varies between 100 and 200 ft. per minute.

Warp size is usually 1-1/4 in., 1-1/2 in., or 1-3/4 in. in circumference. They are usually 6 strand, 24 SWG wire. Most boats carry approximately 120 fathoms of warp on the drum and use a minimum 4:1 water depth to warp length ratio.

The typical dredge is sled type, 7 to 11 ft. wide and weighing 250 to 600 lb. Some dredges have a tooth bar on them where the teeth protrude about 2 in. below the skids and are set at an angle of 35° to 40°. The tooth bar is added depending on type of bottom and to increase efficiency.

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2.1121 A MIDWATER TRAWL FOR THREADFIN SHAD, DOROSOMA PETENENSE

Von Geldern, C. E., Jr. (Inland Fisheries Branch, California Dept. of Fish and Game)
California Fish and Game 58, No. 4, 268-276 (Oct. 1972)

A study was undertaken in 1965 at Lake Nacimiento, San Luis Obispo County, Calif., to evaluate the effects of an experimental introduction of threadfin shad on the existing warm water fishery. Of major concern was the need for an efficient method of sampling shad populations in the pelagic areas of the lake. The lake covers 5,300 acres and has an unusually irregular shoreline, many long arms, sunken islands, and peninsulas which create hazards to midwater trawl operations. The need was for a trawl with the following basic features: (1) it must be of double warp design; (2) it must have rapid dive capability; (3) it must not require the addition of supplementary otterboards or diving doors at any point along the bridles or towing warps.

A net was constructed of this design with the following features: The net is double warp, 10 × 10 × 50 ft., to which are attached two hydrofoils and two depressors. The hydrofoils are at the top and to the sides of the net mouth; the two depressors are at the bottom and to the sides of the net mouth. Two towing warps and bridles are used. One bridle is attached to the right side hydrofoil and depressor, the other bridle is attached to the left side hydrofoil and depressor.

To set the net, the depressors and hydrofoils are arranged on the afterdeck for easy access. While the boat travels about 1 m.p.h., the net is cast out between depressors and then, when net is completely out, depressors and hydrofoils

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2.116 (2.146) ACOUSTIC TECHNIQUES FOR ESTIMATING FISH ABUNDANCE

Ehrenberg, J. E., and D. W. Lytle (University of Washington, Seattle, WA 98105)
IEEE Transactions on Geoscience Electronics GE-10, No. 3, 138-145 (July 1972)

Echo counting and echo integration are two acoustic techniques for estimating the abundance of fish.

The principal shortcomings of the echo-counter is its inability to give an accurate estimate in high fish densities. When two or more fish are separated in depth by an amount less than the depth corresponding to the length of a single pulse, their echoes overlap and only a single count is recorded. However, at low densities the echoes from individual fish do not overlap; the echo counter has a lower error than the echo integrator. The performance of the echo counter deteriorates with increasing fish density.

The echo integrator provides an accurate estimate of fish population provided the mean target strength of a single fish can be accurately estimated. The performance of the echo integrator improves with increasing fish density. The problems of long-term stability and accuracy in echo integration systems can be reduced by digitally processing the data.

The choice of acoustic equipment should be based on the characteristics of the fish population to be surveyed. If the fish density is low, echo counting is the best technique. If the density is high echo integration should be used.

The authors presented mathematical models of both systems. In addition, expressions for the mean squared errors of the abundance estimates taken from each system were obtained.

[5 figures, 4 references] SW

2.1121

are placed in the water. The boat is accelerated to 3 m.p.h., the net is inspected for proper fishing, then the towing warp is let out to the desired length.

To retrieve the net, the towing warp is taken in, the hydrofoils are hauled in with depressors, and the net is pulled in directly over the stern. The boat should be traveling at 3 m.p.h. until the hydrofoils and depressors approach the boat's stern. Then the boat is decelerated to 1 m.p.h. until the net is retrieved.

Adding floats and weights to the hydrofoils and depressors, respectively, eliminates the need for supplementary doors to spread the net. The net dives rapidly (reached a depth of 55 ft. towed at 3 m.p.h. with 200 ft. of towing warp out), but can be modified for situations not requiring rapid diving. Throughout the fishing trials, tangling or fouling of the gear never presented a serious problem. [8 figures, 1 table, 7 references]

Lee Thorson

1.89 (1.0114)

2.3 TEMPEH FOODSTUFF

Gyorgy, P. (pat.)
U.S. Patent 3,681,085
Food Technology 26, No. 11, 127 (Nov. 1972)

Fish pieces and tempeh are mixed, then sterilized, to form an edible food product.

FTP

2.116
(2.146)

HIGH SPEED SCANNING SONAR

Haines, Gregory
World Fishing 21, No. 8, 43, 73 (Aug. 1972)

A high-speed scanning sonar has been designed by the Industrial Development Board of the Canadian Fisheries Service. This type of sonar displays in picture fashion details of surface and bottom with position of net and fish to be netted.

The sonar system was designed to satisfy the following operational requirements: (1) capable of detecting a 5-ton school of herring, approximate volume 12,000 cu.ft.; (2) detection range of 6,000 ft. minimum at 50% probability; (3) capable of use in water with ice conditions; (4) capable of distinguishing otter boards when placed 80 ft. apart at 300 ft. range; (5) capable of distinguishing otter boards from the head and footropes of a trawl; (6) surveillance through 360°; and (7) operation in waters greater than 50 fathoms depth.

The system has potential use as a research tool in acoustic experiments and in fishery research.

[2 diagrams, 1 photograph]

MS

2.3 ROE EXTRACTION

Nordischer Maschinenbau Baader (pat.)
German Patent 2,060,237
Food Technology 26, No. 11, 127 (Nov. 1972)

A fish flank is sliced. As a result, the belly flap drops exposing the roe for removal by a mechanical scraper.

FTP

2.1128 (2.1478)

2.1121 MAKING AND MENDING NETS. PART II

Buckingham, Harry
World Fishing 21, No. 8, 51, 53 (Aug. 1972)

The largest trawling companies ensure that their trawlers carry a good supply of spare parts for damaged nets. The smaller skipper-owners may try to economize and become short on parts to repair their nets. The result can be reduced earning caused by lost fishing time.

The trawler should carry such spares as shooters, belly and patches, bellies and wings, and cod ends. These parts can be fitted to an existing trawl.

The belly and bellies are laced together with reinforced seams. The square and wings are fitted with the bolsh, ready to fix to the fishing line. The headline on the top wings is complete with quarters and staples. The cod and bottom sections are laced at the selvage. For repair of the cod end the upper and lower cod ends are ready laced together.

In the net store, all spare parts should be tied in bundles and marked for easy identification so they can be retrieved quickly as possible when necessary.

[3 figures]

MS

The boats usually operate in a small area and employ intensive fishing efforts. The dredges are hauled at 10- to 30-min. intervals, depending on catch. Once aboard, the scallops are sorted and measured for size and placed in jute bags or drums for later bagging.

[8 figures]

Abstractor: Lee Thorson

2.116 HYDROACOUSTIC ASSESSMENT OF LIMNETIC-FEEDING FISHES

Thorne, Richard E. (Fisheries Research Institute, University of Washington, Seattle, WA 98195)
Proceedings Research on Coniferous Forest Ecosystems--A Symposium, Bellingham, Washington, Mar. 23-24, 1972. Washington Sea Grant 72-22, pp. 317-322 (1972) (University of Washington, Sea Grant Program, Seattle, WA 98195)

Determination of the numbers and biomass of limnetic-feeding fishes is essential to assess recruitment, growth, mortality rates, distribution patterns, and interaction with other trophic levels.

Assessing fish population is required in fishery management; techniques based on catch-per-unit effort and tagging have many inadequacies. Catch statistics are of little value in determining fish populations in lake systems since the fisheries are either limited, highly selective, or nonexistent. The problem can be attacked through application of hydroacoustic assessment techniques.

The equipment used on the lake studies includes an echo sounder incorporated into a system in which target data is recorded on magnetic tape.

Echo counting techniques are limited to relatively low fish densities but they can provide data on size distribution of targets. Echo integration techniques relate fish density to integrated target voltage. A combination of both techniques are used. Basic analysis of data is accomplished by integration, but the integrators are calibrated and size information is derived by echo counting.

Echo counts are made by observation of specific depth intervals on an oscilloscope while the tape recording of a transect is played back. Since echo counting from the oscilloscope is time consuming and limited to low-density situations

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2.3 SCALLOP PROCESSING

Willis, E. D. (pat.)
U.S. Patent 3,662,431
Food Technology 26, No. 8, 95 (Aug. 1972)

This is a method for shucking scallops and for separating the muscle from the viscera. FTP

2.3 HOW TO SELECT SANITARY FLOORING. PART II.

Beauchner, Frank R., and Donald G. Reinert (Atlas Minerals & Chemicals Div., ESB Inc., Mertztown, PA 19539)
Food Engineering 44, No. 10, 120, 122, 126 (Oct. 1972)

Part I of this article described "Chemical Proof" floors commonly used in food industry plants: protective coatings, monolithic surfacings, and metal-plate floors. Another type of floor, the tile or paver, was described in this part II.

The tile floor is the most durable and versatile, and the authors suggest, the most attractive type available to the food industry.

In areas of light traffic, quarry tile of 1/2- or 3/4-in. thickness should be used. Paver of 1-3/16-in. thickness can be used in most areas of the food plant. In heavy load areas or areas subject to extreme thermal shock, thicker brick or tile should be used to take excessive loads or dissipate heat.

The "resin-cement bed" system is a method for installing the tile. Depending on thickness of tile, method of installation, size of installation, and amount of cutting required for drains or pads, cost varies from $2.75 to $4.00 per square foot. The bedding material must be compatible with the finished concrete slab below, and it must adhere to the slab and the tile above. The tile is either buttered in place or set in the bed for grouting. Expansion joints are required. This system is a complete chemicalproof flooring. The tile, and the bed or grout are inert and will not be damaged by corrosives spilled on the floor.

Another flooring system is the "sand-cement bed." A waterproof membrane is applied over the structural slab. Then a conventional sand-cement bed is placed on the membrane. Tile is set into the bed joints left open for grouting. The

(over)

2.3 FISH PROCESSING

Uekusa, H.; Toyo Seikan Kaisha Ltd. (pat.)
U.S. Patent 3,665,557
Food Technology 26, No. 8, 96 (Aug. 1972)

This apparatus separates and removes the red (dark) meat from the white meat of split fish sections. FTP

2.3

sand-cement bed can vary in thickness from 1 to 1-1/2 in. Expansion joints should be used in this system also. Cost of installing this floor ranges between $2.25 and $3.00 per square foot.

In the membrane construction method, a glass cloth reinforcing is installed as part of an asphalt paving applied hot in four to six applications, building up to 1/4 in. Thickness of tile should be less than 1-3/16 in. in this system. A 1/8-in. bed joint of resin cement is applied directly on the membrane, and the tile is then buttered with the resin cement and layed in the bed. Expansion joints are also required for this system. This floor is particularly suited for excessively wet areas. It is chemically inert. Cost of this floor ranges between $3.50 and $4.50 per square foot.

Expansion joints must be considered as a maintenance point in the floor because they are not as durable as the floor. They must be inspected and repaired as required.

Brick pavers and tile are available with aluminum oxide surfaces to prevent sliding. Nonskid coatings such as aluminum oxide or silica can be spread over the floor before curing is complete. Nonskid surfaces should be considered for installation in excessively wet areas to reduce safety hazards.

[2 photographs, 3 diagrams] SW

2.116

basic data processing is done by echo integration. A system called Digital Data Acquisition and Processing System (DDAPS) integrates voltages from fish targets within several depth intervals simultaneously and calculates the fish abundance using input calibration and target strength data.

Typically the average target strength is not known precisely before processing; the density outputs of DDAPS are thus relative rather than absolute. Conversion to absolute density can be made either from measurement of target strengths or by direct comparison of DDAPS output with determinations of absolute density by echo counting.

The absolute density is obtained from various depth intervals along the various lake transects. These densities can be extrapolated over the respective volumes represented by the transects to obtain a total estimate of fish within the lake. The species and size composition must be obtained from net samples. It would be a valuable asset to be able to determine the number of larger fish by acoustic methods, however.

[5 figures, 12 references] MS

2.3 SHELLFISH EVISCERATION

Wenstrom, R. T., and T. S. Gorton; Slade Gorton & Co., Inc. (pat.)
U.S. Patent 3,665,554
Food Technology 26, No. 8, 95 (Aug. 1972)

Bivalve shellfish are shucked, then the viscera are removed from the edible muscle. FTP

2.3 SHELLFISH PROCESSING

Daiichi Shoji KK (pat.)
Japanese Patent 22260/72
Food Technology 26, No. 11, 128 (Nov. 1972)

Shellfish are treated with lactic acid and salt, then heated at 40°-90° C. until semicooked and the flesh is easily removed from the shell. FTP

2.3 SHRIMP PEELER

Mattiesen, E. H. (pat.)
British Patent 1,275,314
Food Technology 26, No. 10, 101 (Oct. 1972)

This shrimp peeler cuts the shells and removes the heads of the shrimp. FTP

2.3 SCALLOP PROCESSING

Willis, E. D.; Willis Bros. Inc. (pat.)
U.S. Patent 3,665,555
Food Technology 26, No. 8, 95 (Aug. 1972)

The apparatus is used to shuck scallops and to remove the viscera from the edible muscle. FTP

2.3 TUNA PROCESSING

Lapeyre, J. M. (pat.)
Canadian Patent 906,309
Food Technology 26, No. 11, 127 (Nov. 1972)

Whole frozen tuna fish are sliced transversely into sections of uniform thickness then the sections are selectively graded prior to canning. FTP

2.3 FISH PROCESSING

Astra Nutrition, AB (pat.)
German Patent 1,692,545
Food Technology 26, No. 11, 127 (Nov. 1972)

By use of a low temperature process, fish byproducts are homogenized and centrifuged to recover protein, fat, nucleotides, and insoluble tissue. FTP

3.15 RADIATION STERILIZATION OF PROTOTYPE MILITARY FOODS: LOW-TEMPERATURE IRRADIATION OF CODFISH CAKE, CORNED BEEF, AND PORK SAUSAGE

Anellis, Abe, D. Berkowitz, W. Swantak, and C. Strojan (Microbiology Division, Food Laboratory, U.S. Army Natick Laboratory, Natick, MA 01760)
Applied Microbiology 24, No. 3, 453-462 (Sept. 1972)

Little information is available on the radiation resistance of Clostridium botulinum spores in codfish cake, corned beef, and pork sausage. This study involved the prototype radiation sterilization process at -30° ± 10° C. for these products using C. botulinum type A and B spores as the index of microbiological safety. Radiation temperature of about -30° ± 10° C. was used because it gave a reasonable balance between sterilizing dose, organoleptic quality, and process costs.

"Screening" packs consisting of 10 lots each of the three products [each lot containing about 10^6 spores of a different strain (5 type A and 5 type B) of C. botulinum per can] were irradiated with a series of doses of ^{60}Co gamma rays. The cans were stored for 3 months at 30° C. and then examined for swelling, toxin, and recoverable botulinal cells. The median lethal dose (LD_{50}) and D values were estimated for each strain of C. botulinum in each food.

The most resistant strain in codfish cake was 53B; in corned beef, 77A; and in pork sausage, 41B [the 10 strains used are described in Appl. Microbiol. 15, 166-177 (1967)]. The two antigenic types of C. botulinum showed no clear-cut

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3.2490 DECOMPOSITION OF TRIMETHYLAMINE OXIDE AND CHANGES IN PROTEIN EXTRACTABILITY DURING FROZEN STORAGE OF MINCED AND INTACT HAKE (MERLUCCIUS PRODUCTUS) MUSCLE

Babbitt, Jerry K., David L. Crawford, and Duncan K. Law (Dept. of Food Science and Technology, Oregon State University, Seafoods Laboratory, Astoria, OR 97103)
Journal of Agricultural and Food Chemistry 20, No. 5, 1052-1054 (Sept.-Oct. 1972)

Recently, various workers isolated an enzyme system from fish and shellfish that reduces trimethylamine oxide (TMAO) to trimethylamine (TMA), dimethylamine (DMA), and formaldehyde. This enzyme system was examined at experimental temperatures of 0° C. and higher, but some evidence seems to indicate that a similar reaction occurs in some fish during frozen storage. The purpose of the present study, thus, was to examine the formation of formaldehyde and the degradation of TMAO in intact muscle and minced muscle of Pacific hake during frozen storage of the samples. In addition, changes in the muscle protein were determined to find out whether the various changes were affected by different packaging methods.

Freshly caught Pacific hake were divided into two groups and thoroughly washed. The first group was filleted, and the fillets were packed in stainless-steel trays and frozen at -30° C. The second group was dressed then passed through a fish separator machine that separated the muscle (and minced it) from the bones and skin. The minced muscle was packed in stainless-steel trays and frozen at -30° C. Both groups of frozen hake were cut into blocks, then air- or vacuum-sealed in moisture vapor-proof pouches or wrapped in polyethylene film.

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3.23 (3.27) VACUUM SYSTEM THAWS FASTER

Everington, D. W. (Clarke-Built Ltd., Thetford, Norfolk, England), and A. Cooper (A.P.V. Co., Ltd., Crawley, Sussex, England)
Food Engineering 44, No. 10, 76-78 (Oct. 1972)

In the food freezing process, moisture in the outer surface layers quickly freezes, causing increased local thermal conductivity. As the freezing proceeds, the frozen zone extends inward, and the heat flow from the center outward increases progressivly as the freeze boundary contracts.

The opposite occurs in thawing. As outer layers thaw, their relative thermal conductivity decreases; thus, heat flow inward is progressively slower. To shorten thaw time, the film coefficient (a measure of the amount of heat flowing across the food surface) must be increased.

In vacuum heat thawing, condensing steam vapor is used to obtain a high surface coefficient. The thawer is a horizontal cylindrical vessel which is loaded with food products to be thawed.

Results of simulated tests of the thawer are as follows: (1) A 10-cm.-thick whole cod block was thawed in 4½ hr. at a vapor temperature of 68°F. No over heating occurred and the fish was firm and easily filleted. (2) Beef blocks, 4 and 9 cm. thick were thawed to a condition suitable for mechanical cutting in 20 and 60 min., respectively. A 1-ton-capacity batch unit thawer occupying 60 sq. m. of floor could thaw 2 tons per hour preparatory to mechanical cutting.

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3.26 (9.2) FRESH FISH SALES AS A FUNCTION OF PROMOTION IN A PORTLAND, OREGON, GROCERY CHAIN

Batie, S. S., and F. J. Smith (Dept. of Agricultural Economics, Oregon State University, Corvallis, OR 97331)
Special Report 372, Agriculture Experiment Station, Oregon State University, Corvallis, OR 97331 (Oct. 1972), 18 pp.

Retail grocers advertise seafood both with and without price discounts; they do not always know which policy results in more profits. This report examines the marketing of three fish items to determine which advertised price policy would result in the largest total revenue from each item.

It is possible that an advertised price discount will not increase sales enough to compensate the grocer for the price reduction. It is also possible that total revenue could rise with an advertised price increase because sales do not decline significantly. A retail grocer will want to know which result he can expect from a given policy.

He therefore requires a measure of the change in total revenue (price multiplied by sales) expected from a change in advertised price; this change can be estimated by determining the advertised price elasticity which is a measure of percentage change in sales that results from a percentage change in advertised price. The behavior of the relation between total revenue and elasticity measurements is as follows: when advertised price elasticity is greater than 1.00 (or elastic), total revenue moves inversely with advertised price changes. As advertised price falls, total revenue rises. As advertised price rises, total revenue falls, When advertised price elasticity is inelastic (less than 1.00),

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3.23 (3.27)

Vacuum thawers come in units in which two processes can be performed sequentially. When thawing is complete, cooking commences as steam is injected into the vessel at 30 p.s.i. After cooking is complete, a vacuum pump evacuates the thawing chamber and rapidly cools the product. The thawer can be manufactured from stainless or carbon steel clad with plastics or stainless steel. The cost per ton of thawing frozen whitefish is calculated to be $5.20.
[2 figures, 2 tables, 1 photograph]

SW

3.234 DEEP FREEZING PROBLEMS (3.24)

Savi, P., and U. Sellerio
Ann. Ist. Sup. Sanita, No. 6, 425-451 (1970) (In Italian)
BFMIRA Abstracts 25, No. 10, Abstract No. 3715, 743 (Oct. 1972)

"Report on the problems in the treatment of deep-frozen foodstuffs, mainly relating to raw materials, treatment, freezing, storage and control. Two methods are mentioned for the control and the estimation of the quality of lean and fatty fish, applicable when the thermal history of the product is known, i.e. storage time and process."

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3.26 (9.2)

total revenue moves directly with changes in advertised price. As advertised price falls, total revenue also declines, and vice versa. Total revenue is at a maximum where advertised price elasticity is equal to 1.00. It is important to understand that this concept does not incorporate costs; therefore, determination of elasticity will not reveal net revenues resulting from advertising.

Price elasticity of demand is the percentage change in quantity sold that results from a percentage change in price, other things being equal. The quantity sold will increase as result of a price reduction. An increase in quantity sold resulting from successful advertising is called the advertising effect. If the price were also reduced the increase would be called the advertised price effect.

A study was conducted of a 20-store grocery chain in Portland, Ore., with reference to estimated advertised price elasticity of demand. The results indicated that red snapper and sole sales had inelastic advertised price elasticities of demand. Silver salmon sales had elastic advertised price elasticities of demand. The predictions were that shortrun gross revenues would increase if an advertisement for silver salmon included a price discount. Conversely, sole and red snapper sales would have larger gross returns if the advertisements did not include a price discount.
[3 figures, 5 tables, 10 references]

SW

3.15 ENZYMIC CHANGES IN IRRADIATED FISH DURING STORAGE AT 0° (2.03)

Jobsen, J. W., G. Lunde, and B. Underdal (Fiskeridir. Kjemisk-Tek. Forsholingsinst., Bergen, Norway)
Chemical Abstracts 77, No. 3, 18232b (July 17, 1972)

3.26 AN ASSESSMENT OF FRESH/FROZEN PREPACKS IN RETAIL OUTLETS

Anonymous
Fish Ind. Rev. 2, No. 3, 4-6 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3640, 728 (Oct. 1972)

The results of a trial conducted by the White Fish Authority to measure the costs of production, distribution and retailing of both chilled and frozen prepacked fish are reported. It was concluded that the most desirable method of retailing prepacked fish for modest levels of demand was frozen prepacks. D.B.

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3.15

trend in comparative order of resistance among the three foods. LD_{50} values and D values gave essentially the same order of resistance, and they may be used interchangeably for the 10 test organisms.

"Clearance" packs of each of the three foods with the most resistant strain (about 10^7 spores/can) were irradiated with various dose levels at 30° ± 10° C. (100 replicate cans per dose). Codfish cake was irradiated from 1.0 to 4.5 Mrad, corned beef from 1.0 to 4.0 Mrad, and pork sausage from 0.5 to 3.5 Mrad in units of 0.5 Mrad. The packs were stored at 30° C. for 6 months, then were examined for swelling, presence or C. botulinum toxin, and viable cells. The minimal radiation dose (MRD) for the three products inoculated with spores of the most resistant strain of C. botulinum is shown in the table that follows.

Food product	Strain of C. botulinum	Experimental sterilizing dose (ESD)	Method of estimating 12D dose [1]	
			Exponential distribution	Normal distribution
Codfish cake	53B	2.5 < ESD ≤ 3.0	3.24	3.09
Corned beef	77A	2.0 < ESD ≤ 2.5	2.44	2.57
Pork sausage	41B	1.5 < ESD ≤ 2.0	2.65	2.39

[1] Based on recoverable cells.

Corned beef treated with sublethal doses (0.5, 0.75 Mrad) of irradiation showed increased visible spoilage rate over that of unirradiated controls. It appears that the radiation-injured spores of C. botulinum were sensitive to the presence of food additives (such as curing salts, NaCl, and spices).
[1 figure, 8 tables, 49 references]

FTP

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The samples were stored at -20° C. The samples were removed periodically from storage (up to 120 days) for examination.

DMA and formaldehyde formed in the hake fillets during storage. The minced flesh showed a greater rate of production of DMA and formaldehyde than did the fillets. The TMA, DMA, and formaldehyde contents of freshly minced hake muscle were from 2 to 4 times higher than were those in the fillets. The formation of DMA and formaldehyde was not affected by the exclusion of oxygen (by vacuum packaging of samples). The pattern of formation of DMA and formaldehyde in the stored frozen fillets of hake was the same regardless of packaging method (vacum sealed or air sealed in moisture vapor-proof pouches or wrapped in polyethylene film). But, the formation of DMA and formaldehyde increased steadily in the packaged minced muscle during frozen storage; after 4 months of storage, the minced hake muscle showed from 1.5 to 2 times higher levels of DMA and formaldehyde than did the fillets. The amount of extractable protein in the hake varied directly with the increase in DMA and formaldehyde contents.
[6 figures, 18 references]

FTP

3.338 NEW ERA FOR METAL CONTAINERS

Norman, G. F., and J. A. G. Rees (Research and Development Dept., The Metal Box Co., Ltd.)
Food Manufacture 47, No. 9, 27, 28, 31 (Sept. 1972)

The development of the food can over many years has culminated in such advances as thinner but stronger plate, and differential tin coating. In the processing area filling speeds have increased to over 1,000 cans per minute, and continuous processing techniques are employed.

Today the need of convenience and esthetic improvements are making demands for continuing development of the can. "Easy-Open end" cans have become firmly established among consumers. This type of can requires careful control of the manufacturing process to produce ends of high integrity. The Easy Open end can was originally used for nonprocessed foods such as spices and vacuum-packed peanuts. It is now being used to pack more critical processed foods. Successful packing depends on minimal metal exposure; thus, the plate is lacquered prior to fabrication, and the end is spray lacquered after fabrication to ensure complete coverage. Lacquer systems are being developed to withstand the fabrication process so that the post lacquer step may be eliminated. Products with salt content above 0.5%, having high labile sulfur or acid, and packed in fully lacquered cans, have been found to be the most critical. Mildly acid products in plain cans are the least vulnerable.

Interest has continued in full aperture, aluminum, easy open ends. The cost of all-aluminum cans, the modification of procedures required, and severe bimetallic corrosion when used with tinplate mitigate against aluminum. The oval, all-

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4.21 USE OF LABELED COMPOUNDS TO STUDY THE MECHANISM OF FLAVOR FORMATION IN OXIDIZING FATS

Michalski, S. T., and E. G. Hammond (Dept. of Food Technology, Iowa State University, Ames, IA 50010)
Journal of the American Oil Chemists' Society 49, No. 10, 563-566 (Oct. 1972)

Oxidation of fats produces complex mixtures that include aldehydes, ketones, hydrocarbons, acids, and alcohols. These products arise from scission of the fatty acyl chains. E. R. Bell, J. H. Raley, F. F. Rust, F. H. Seubold, and W. E. Vaughn [Faraday Soc. 10, 242 (1951)] proposed a chain-splitting mechanism represented by the following equation:

$$R_1\text{-}CH(OOH)\text{-}R_2 \rightarrow R_1\text{-}CH(O\cdot)\text{-}R_2 \longrightarrow R_1\cdot + R_2\text{-}C(=O)\text{-}H$$
$$R_1\text{-}CH(O\cdot)\text{-}R_2 \rightarrow \cdot OH + R_2\cdot + R_1\text{-}C(=O)\text{-}H$$

The alkyl free radicals can gain a hydroxy free radical to form alcohols and they can lose or gain a hydrogen free radical to form alkanes, alkenes, or alkynes.

The evidence for the scission mechanism is indirect, and some products have been identified that are not attributable to this mechanism. The vinyl ketones and vinyl alcohols, for example, found in oxidized fats require a more complex mechanism.

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4.14 (1.951) THE HARBOR SEAL PHOCA VITULINA CONCOLOR DE KAY: COMPARATIVE DETAILS OF FATTY ACIDS IN LUNG AND HEART PHOSPHOLIPIDS AND TRIGLYCERIDES

Ackman, R. G., S. N. Hooper, and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Canadian Journal of Biochemistry 50, No. 7, 833-838 (1972)

Reports of other work on the leatherback turtle indicated that phospholipids of the lung were low in polyunsaturated fatty acids (about 3.1%). This small amount was considered to be unusually low for a lipid from a marine animal. In addition, trans-6-hexadecenoic acid was observed to accompany palmitic acid (16:0) in the lipids of the lung and heart.

To compare the occurrence of polyunsaturated fatty acids (PUFA) in the lung of marine animals, and to search for trans-6-hexadecenoic acid accompanying 16:0 into lung tissue, experiments were performed on fresh lungs obtained from a harbor seal.

The fatty acids of phospholipids and triglycerides from the lung and heart of the harbor seal were different from fatty acids in the blubber (depot fat). The difference was due to high levels of PUFA 20:4ω6 in the phospholipids; furthermore, the organ triglycerides resembled the phospholipids in saturated fatty acid composition and the depot fat in monoethylenic fatty acid composition. However, the organ triglycerides had low levels of the PUFAs 20:5ω3, 22:5ω3, and 22:6ω3 compared to depot fat.

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4.60 ANTIOXIDANTS FOR FOOD FATS AND OILS

Sherwin, E. R. (Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Co., Kingsport, TN 37662)
Journal of the American Oil Chemists' Society 49, No. 8, 468-472 (Aug. 1972)

The types of antioxidants now available for use in food fats and oils are mentioned, and the theoretical and practical aspects of selecting the proper antioxidants for various food uses are discussed. Also, the author discusses the relative potencies, modes of application, and regulations governing use of antioxidants, and some of the important problems encountered in their commercial application. Future needs for and possible developments with fat and oil antioxidants are discussed.
[21 references] FTP

4.61 ANTIOXIDANTS FOR SEAFOOD

Toda, Yoshio, Masayoshi Nishiyama, and Mizuo Imamura (Taiyo Kagaku Kogyo Co., Ltd.) (pat.)
Japanese Patent 19,575/71 (June 1, 1971)
Chemical Abstracts 77, No. 5, 33122j (July 31, 1972)

4.14 (1.951)

Turtle lung phospholipids did not show as much PUFA 20:5ω3 as the seal lung phospholipids, and less 22:6ω3, 22:5ω3, and 20:4ω6. The authors suggest the difference in polyunsaturated fatty acids may be due to evolutionary reasons and unrelated to functional needs.

The presence of trans-6-hexadecenoic acid could not be detected in seal lipids by gas-liquid chromatography (GLC) or in lung phospholipids by silver nitrate-impregnated silicic acid thin-layer chromatography isolation of monoethylenic materials followed by GLC. The accumulation of this acid as a component of the fats of the turtle, the authors suggest, is probably associated with diet. [1 table, 21 references] SW

4.13 FATTY ACID COMPOSITION OF TOTAL LIPIDS IN THE PLAICE PLEURONECTES HERZENSTEINI OF VARIOUS AGE GROUPS

Stepanova, V. A. (Med. Inst., Vladivostok, U.S.S.R.)
Chemical Abstracts 77, No. 1, 2939b (June 19, 1972)

4.21 THE EFFECT OF HEAVY METALS ON FAT AUTOXIDATION AND THE OCCURRENCE OF HEAVY METALS IN FATS

Franzke, C., S. Grunert, and K. H. Rossow
Lebensmittel-Ind. 19, No. 7, 279-281 (1972) (In German; English summary)
BFMIRA Abstracts 25, No. 10, Abstract No. 3623, 724 (Oct. 1972)

A table is given of the copper, iron and nickel contents of oils from rapeseed, cotton seed, soya, calabash, olive and groundnut. The effect of heavy metals on the autoxidation of fats is considered and a maximum level of 5.5 ppm iron and 0.03 ppm copper is recommended. C.S.B. Reprinted

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4.13 LIPIDS IN FISH FILLET AND LIVER. (4.15) COMPARISON OF FATTY ACID COMPOSITIONS

Lambertsen, Georg (Gov. Vitamin Lab., Norway)
Chemical Abstracts 77, No. 5, 32964y (July 31, 1972)

3.338

aluminum, German Hansa can with an Easy Open end has been introduced for fish and other packs.

Fruit juice cans with easy end opening have achieved shelf life of over 12 months. The beer can is no longer made with soldered seams, instead adhesives and welding, and two-piece drawn and wall ironed cans are used. The necked can has also appeared for beer.

Tin-free steel is protected by a very thin chromium/chromium oxide coating in place of tin. The plate is lacquered and nylon bond is preapplied. In fabrication of the can, the blanks are lap bonded by application of heat followed by rapid cooling. Coverage of the lap seam cut edge is essential to prevent iron pickup. The can is then sprayed with a coat of lacquer.

Drawn and wall ironed aluminum and tinplate have been developed for beverage containers. These cans can also be "necked in" to give better appearance and take up less room in storage.

The Soudronic welding process has been developed to weld tinplate. As the welded can has a lap side seam, the cut edge must be covered to prevent iron pickup. The welded can performance is similar to that of the soldered can in storage.

Beaded cans are not new; however, the technique has been applied to the new thin-walled, double reduced plate cans.

Aseptic canning is now practiced to prevent overheating foods. Sterilization of product and container take place separately. Filling and seaming are performed in a sterile environment. One large growth area using this method is the all-aluminum containers for desserts.

With the advent of Easy Open cans for beverages a new family of metal containers is being introduced which will be convenient and have high market appeal. [6 photographs] SW

4.21

Study of the scission reaction is difficult because of the low yields and because the intermediates are unstable. In the present study, therefore, the authors used labeled compounds to study the fate of primary scission products after they are found in oxidizing fats.

2-^{14}C-Hexanal, trans, trans-5-^{14}C-2,4-decadienal, 4-^{14}C-1-octen-3-ol, 4-^{14}C-1-octen-3-one, and 1-^{14}C-1-pentanol were synthesized and added to freshly deodorized soybean oil at levels of 15 p.p.m., 125 p.p.m., 7 p.p.m., 9 p.p.m., and 19 p.p.m., respectively. The soybean oils containing the compounds were oxidized, and the fate of the labeled compounds was followed.

Hexanal was converted to hexanoic acid especially at 50° C. and higher temperature. 2,4-Decadienal was converted to 2,4-decadienoic acid at room temperature; the labeled products included heptenal, 2-octanol, 2-nonanal, glyoxal, and malonaldehyde. 1-Octen-3-ol was converted to 1-octen-3-one at room temperature; the 1-octen-3-one formed a stable end product that produced no other labeled compounds. 1-Pentanol was converted to pentanoic acid at 50° C. and at higher temperature. [1 figure, 3 tables, 27 references] FTP

4.29 EFFECT OF γ-RADIATION ON SEA BASS OIL AND A CHANGE IN IRRADIATED OIL DURING STORAGE

Dubrovskaya, T. A. (U.S.S.R.)
Chemical Abstracts 77, No. 1, 3943k (July 3, 1972)

6.135 (9.19) CONTROLS ODORS AT LOW COSTS

Willoughby, E., and J. Curnick (Giffels Associates, Detroit, Mich.), and J. Curnick (Meade-Johnson Co., Zeeland, Mich.)
Food Engineering 44, No. 10, 107, 110, 112 (Oct. 1972)

Anaerobic waste treatment plants may produce odors of which the principal component is hydrogen sulfide. A plant, which utilizes skim milk in the preparation of diet foods and infant feeding formulas, used the anaerobic digester to reduce the pollutants prior to aerobic sludge system treatment and final discharge. Occasionally, objectionable odors were noticed near the treatment plant, especially on a calm day.

Analysis of digester stack gas samples by gas chromatography indicated the following constituents: nitrogen, 77%; oxygen, 18%; methane, 3.5%; carbon dioxide, 1.6%; ammonia, less than 0.25%; hydrogen sulfide, less than 0.01%; and water vapor, trace.

An odor control system using a hypochlorite solution as a wet scrubbing medium was selected. In this system electrolytic cells generate sodium hypochlorite. The cells consist of graphite anodes surrounded by tubular cathodes with a small annular space in between.

Raw sewage, digested sludge, and other liquid wastes are oxygenated by circulation through the cells. Addition of chlorides such as common salt to the recirculating solution produces a strong sodium hypochlorite solution which is used to scrub the digester exhaust gas. Sodium hypochlorite is an oxidizing (over)

6.190 COMPARATIVE FREE CHOICE SELECTION OF VARIOUS FISH MEAL DIETS BY THE CHICK

Berg, Lawrence R., and R. D. Martinson (Dept. of Animal Science, Washington State University, Western Washington Research and Extension Center, Puyallup, WA 98371)
Poultry Science 51, No. 5, 1684-1689 (Sept. 1972)

Results of earlier work indicated that chicks have a sense of taste, and palatability of diet was important in selecting ingredients.

Tests were conducted to determine the palatability of diets containing fish meals produced from various fish. One-week-old chicks were given a choice between diets containing either Peruvian anchovy, herring, or hake meal.

The chicks consumed less of the anchovy meal diet than of diets containing herring or hake meal. Of the anchovy diet they preferred a 10.7% fat content over one containing 6.4% fat. No such difference in preference was found in diets containing hake meals with similar fat contents.

There was no difference in preference for diets containing hake meal, or British Columbia or Atlantic herring meals. The chicks tended to show a preference for diets containing Norwegian herring meal. In comparisons of Norwegian herring meal and anchovy meal, the chicks preferred the herring diet when the meal content was only 5%.

The authors indicated decreased palatability may have been associated with decreased nutritional quality. Chicks in a feeding test weighed about 380 g. on an anchovy diet compared to chick weights of 440 g. on diets made with various herring meals. [5 tables, 5 references] SW

6.19 COMPARATIVE SELENIUM RETENTION BY CHICKS FED SODIUM SELENITE, SELENOMETHIONINE, FISH MEAL AND FISH SOLUBLES

Miller, David, Joseph H. Soares, Jr., Paul Bauersfeld, Jr., and Susan L. Cuppett (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Poultry Science 51, No. 5, 1669-1673 (Sept. 1972)

Selenium (Se) is essential in the diet of the chick. Reports on Se content of fish meals indicated a range of 2.22 to 2.78 p.p.m. When 10 p.p.m. of α-tocopherol acetate (vitamin E) is present in the diet, the Se requirement can be supplied with 0.05 p.p.m. The content of vitamin E is usually low (3-5 p.p.m. α-tocopherol) in commercial poultry feeds. Since fishery products are the major contributors of Se, its availability and retention from these sources are important factors in poultry nutrition.

A study was conducted to determine the retention by the chick of Se derived from fishery products and to compare the retention of Se from fishery products with Se derived from sodium selenite and selenomethionine.

Two low Se content basal diets used contained crystalline amino acids and high levels of α-tocopherol acetate (200-300 p.p.m.). Day-old chicks were found to contain 11 µg. Se; chicks fed one of the basal diets without Se supplement for 21 days contained 37% less. Day-old chicks with a body reserve of 13 µg. Se, and fed the other basal diet for 18 days, lost 35% Se.

An Se balance in the chick was maintained by a dietary level of 0.05 p.p.m. of sodium selenite, selenomethionine, fish meal or fish solubles supplements to (over)

6.32 (6.36) MARINE POLYMERS. IV. DIATOM POLYSACCHARIDES

Allan, G. G., J. Lewin, and P. G. Johnson (University of Washington, Seattle, WA 98195)
Botanica Marina 15, 102-108 (1972)

Information on carbohydrate components in diatoms is lacking. Diatoms are a group of the phytoplankton which are easily cultured. A preliminary examination of the polysaccharide components of several diatom species was performed.

Cells were grown in enriched sea water and collected before any decline of the culture population occurred. The carbohydrate contents of the culture media were determined only after removal, by dialysis, of low molecular weight entities.

In the yield of extracellular water-soluble polymers the deoxyhexoses predominated. Rhamnose was the major constituent; mannose, galactose, and fucose were present in substantial amounts. Xylose, glucose, ribose, and arabinose were minor constituents or absent. Glucuronic acid was present in every polymer examined. Nitzschia frustulum var. perpusilla gave the highest yield of carbohydrate, 15 mg. per liter of culture; the other diatoms tested yielded from 0.1 to 5.2 mg. carbohydrate per liter. The methods used to identify carbohydrate included paper chromatography, gas-liquid chromatography, and ionophoresis. These methods failed to identify three unknown monomers.

Sugars obtained by extraction of the diatoms with hot water and hydrolyzed, included glucose and traces of other sugar monomers of the type found in the extracellular extract. (over)

6.19

either basal diet. This quantity of Se was supplied by a dietary level of 2.5% fish meal or solubles. When 2.5% fish meal was fed only 13% of the ingested Se was retained. Increasing fish meal to 5% increased the Se retention to 29%. The higher levels of Se derived from fish meal were retained slightly more effectively than Se derived from fish solubles.

The retention value obtained by supplying 0.1 p.p.m. Se derived from sodium selenite was 35%. The retention of Se derived from selenomethionine was greater than from other sources, 48.5%. The maximum retention reached a peak at 0.1 p.p.m. and declined at higher levels of Se ingestion.

The authors suggest that Se retention is maximized when dietary intake of Se is low, or conversely, the retention is minimized when Se intake is comparatively high. [4 tables, 7 references] SW

6.130 RENDERING PROCESS

Keith, J. G.; Duke, Inc. (pat.)
U.S. Patent 3,673,227
Food Technology 26, No. 10, 106 (Oct. 1972)

This patent is for a continuous process for dry rendering fish (and animal or poultry) byproducts. FTP

6.32 (6.36)

The residue remaining after extracting the diatoms with hot water was examined. Mannose was a major component of the hydrolyzate, and galactose content was substantial. Fucose was the main sugar in two hydrolyzates. Xylose was present as a trace; ribose and arabinose were absent. Glucose was present in substantial amounts only in the hydrolyzate from N. angularis which consisted mainly of fucose. Unknown monomers were also present.

Since N. frustulum gave the highest yield of extracellular carbohydrate it was selected for mass culture study, Seventyfold reduction of salt content in the medium doubled cell count, reduced cell size, and increased yield of extracellular polymer sixfold. A minimum in yield corresponded to salinity at which diatom growth was minimal.

Recycling of the culture medium was found to be acceptable by addition of nutrients, sterilization, and reinoculation with diatoms. In addition, the production of polymer started in the period between the log- and stationary-growth phases and continued during the growth phase for 14 days.

Because of their gelling characteristics, the authors suggest that the extracellular polymer from N. frustulum is potentially useful. Furthermore, the growth of new culture in previously used medium refortified with nutrients indicated that a cyclic process is possible.
[2 figures, 6 tables, 17 references] SW

6.135 (9.19)

compound; its presence in sewage causes a reduction in oxygen demand. Discharge of sewage treated with hypochlorite into a stream will not harm the environment as much as untreated sewage.

The cost for eliminating the odors on two digesters was $20,000.
[1 figure] SW

6.135 START REDUCING ODOURS NOW TO MINIMIZE COST (9.19)

Retrum, R.
Nat. Provis., 166, No. 23, 104-108, 113-114 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3767, 753 (Oct. 1972)

The sources, the chemical constituents involved, methods of measurement, and guidelines for controlling the amount of odour produced when rendering offal are described. (From a paper read at the 31st meeting of the National Independent Meat Packers Association, 11-13th May, 1972, Chicago.) C.C.E. Reprinted

6.37 DUCKWEED AS CHICKEN FEED

Anonymous
Feedstuffs 44, No. 44, 26 (Oct. 23, 1972)

This article reports that researchers at Louisiana State University (LSU) indicate that duckweed might be a suitable ingredient in poultry feeds. The duckweed is a tiny, free floating, aquatic plant common throughout Louisiana. The LSU researchers found that the metabolizable energy value of duckweed was better than that for alfalfa meal.

Duckweed compared favorably with alfalfa as a poultry feedstuff. Duckweed protein was a better source of lysine and arginine than was alfalfa protein, but it contained a lower level of methionine.

If duckweed could be grown economically, its utilization would offer several advantages. It grows well on waste lagoons and grows wild on many bodies of water, thus it could be grown without displacing any other crop activity. Duckweed grows rapidly and is resistant to most pests and plant diseases. Apparently, it removes substantial quantities of chemicals from waste water and, therefore, could be used to reduce chemical contamination of lakes and streams receiving lagoon discharges. FTP

6.19 KASUGAMYCIN-CONTAINING FEEDS FOR FISH AND WARMBLOODED ANIMALS (0.5)

Microchemical Research Foundation
French Patent 2,076,415 (Nov. 19, 1971)
Chemical Abstracts 77, No. 7, 47012k (Aug. 14, 1972)

6.33 AGAR PROCESSED FROM GRACILARIA FOLIIFERA OF FLORIDA

Matsuhashi, Tetsujiro, and Kaneo Hayashi (Nagano State Laboratory of Food Technology, Faculty of Agriculture, Gifu University, Japan)
Agricultural and Biological Chemistry 36, No. 9, 1543-1552 (Sept. 1972)

The red alga G. foliifera is found off the south Atlantic coast of the United States. The authors prepared an agar from this alga using the alkali treatment and cooking method of K. Funaki and Y. Kojima [J. Jap. Soc. Sci. Fish. 16, 401 (1951) and ibid. 16, 405 (1951)]. The agar processed from G. foliifera appeared to have good possibilities for commercial uses, including uses in the food industry. Data are given on the chemical and physical properties of agar from G. foliifera and of agars from other seaweeds.
[4 figures, 5 tables, 24 references] FTP

6.54 SEA URCHIN EGG PRODUCT

Yamato Sangyo KK (pat.)
Japanese Patent 16780/72
Food Technology 26, No. 10, 105 (Oct. 1972)

Seasoned sea urchin egg paste is produced by adding 5'-ribonucleotides. FTP

6.54 APPLICATION OF TERNARY EQUILIBRIUM DATA TO THE PRODUCTION OF FISH PROTEIN CONCENTRATE

McPhee, A. D., and D. L. Dubrow (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
Journal of the American Oil Chemists' Society 49, No. 9, 501-504 (Sept. 1972)

Ternary equilibrium data obtained from laboratory studies of the solvent extraction of raw menhaden were examined by standard chemical engineering techniques. The purpose of the study was to determine the theoretical minimum solvent ratios and the number of ideal extraction stages required to produce a concentrate with less than 0.5% residual lipids. The menhaden fish were used because they are commercially available and are suitable for the production of fish protein concentrate (FPC). To determine minimum solvent ratios for the extraction of menhaden, ternary equilibrium data for the systems water-isoproponal-menhaden oil and water-ethanol-menhaden oil were used. These data were reported earlier in J. Chem. Eng. Data 17, No. 2, 244 (1972). Additional data were obtained in this present study in order to calculate the number of extraction stages needed to produce the FPC.

The removal of water and oil from raw fish probably is not strictly a leaching process for all extraction stages. A portion of the water and oil seems to be held loosely by the raw protein, and thus the first extraction stage is little more than a wash. Leaching does occur from the second stage on.

Low temperature (50° C.) extraction of menhaden with azeotropic isopropanol would require a large solvent to solids ratio. The engineering analysis indicates that 100% isopropanol is a better solvent than 87.7% w/w (azeotropic)

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6.54 (0.5) EXPERIMENTAL PRODUCTION OF ENTEROTOXIN B IN FISH PROTEIN CONCENTRATE

Fung, Daniel Y. C. (Dept. of Microbiology, Pennsylvania State University, University Park, PA 16802)
Journal of Milk and Food Technology 35, No. 10, 577-581 (Oct. 1972)

Fish protein concentrate (FPC) contains a wide distribution of amino acids, vitamins, and minerals and is easily digested by human beings. Because it is nutritious and suitable for growth of animals, it is likely, too, that FPC might support the growth of microorganisms. This paper reports on the growth of and toxigenesis by S. aureus S-6 in aqueous suspensions of two commercial samples of commercially prepared FPC, in beef broth, and in suspensions of two solid foods supplemented with FPC. The two commercial samples of FPC were suspended in distilled water as 1, 3, 5, 10, 15, 30, and 50% (w/v) levels, then the suspensions were sterilized. Vitamins (biotin, pantothenate, niacin, and thiamine) were added to a similar series to determine the effect of the addition of vitamins on the growth of and toxin formation by the test organism S. aureus S-6. Two FPC samples were added, individually, at levels of 0, 1, 5, and 10% (w/v) to the beef broth base, and to 50% suspensions of corn flour and of wheat flour. The test mixtures (slurries) were sterilized. S. aureus inocula were introduced into the sterile suspensions of the FPC samples and the FPC--supplemented food samples (includes the beef broth).

S. aureus S-6 was able to grow and to produce entertoxin B in sample suspensions of commercially prepared FPC and of foods supplemented with FPC. The yields

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6.54 (0.8) ENGINEERING ECONOMIC MODEL FOR FISH PROTEIN CONCENTRATION PROCESSES

Almenas, K. K. (University of Maryland, Dept. of Chemical Engineering, College Park MD 20740), L. C. Durilla (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740), R. C. Ernst, J. W. Gentry, M. B. Hale, and J. M. Marchello
NOAA Technical Report NMFS CIRC-367, U.S. Dept. of Commerce, NOAA, National Marine Fisheries Service, Washington, DC 20235 (Oct. 1972), iii + 175 pp. For sale by the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Price $1.50.

A process engineering economic model for fish protein concentration processes has been developed. The model predicts the construction and operating costs for fish meal plants and for plants producing fish protein concentrate (FPC) by: isopropyl alcohol extraction, biological, and press cake-isopropyl alcohol extraction.

Typical process flow sheets and a computer program were developed to be used in the design and cost computations. The model provides for each process to be studied both internally and externally in comparison with alternate processes. The program and model were prepared in such a way that changes and updating may be accomplished quite readily as new information becomes available. This report contains directions for users and descriptions of the processes. A listing of the computer program and example calculations for each process are presented in the Appendix to guide the user and to illustrate the nature of the model output.

While the model does develop construction, operating, and production aspects of the processes, it does not deal with the economics of selling the products and

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6.54 ISOLATING PROTEIN FROM FISH OR FISH PRODUCTS

Gasser, Rupert Josef, and Lienhard Hodo Huster (pat.) (Societe des Produits Nestle S.A.)
German Offen. (patent) 2,145,936 (Mar. 30, 1972)
Chemical Abstracts 77, No. 5, 33098f (July 31, 1972)

of enterotoxin B increased with the increase in level of FPC in the FPC suspensions and in the FPC-supplemented foods. This information does not and should not imply that FPC is not a safe food, but rather that care should be exercised in the manufacturing, packaging, shipping, and storing of this highly nutritious food.
[4 figures, 1 table, 37 references] FTP

6.54 (0.5)

6.54 FORMING GELS FROM FISH PROTEIN PREPARATIONS, ESPECIALLY FOR FOODS

Stala, Aleksander, and Teresa K. Szacillo (Morski Instytut Rybacki) (pat.)
German Offen. (Patent) 2,146,389 (Mar. 30, 1972)
Chemical Abstracts 77, No. 5, 33093a (July 31, 1972)

6.54 FISH PROTEIN HYDROLYSATE

Roels, O.; John J. Ryan & Sons, Inc. (pat.)
Canadian Patent 902,420
Food Technology 26, No. 10, 101 (Oct. 1972)

Finely divided fish is hydrolyzed with acid (pH 1.5 or lower) at elevated temperature and pressure. The hydrolysate is then separated into oil and protein fractions. FTP

6.54 (0.8)

6.54 (6.19) THE POTENTIAL OF FISH PROTEIN CONCENTRATE FOR DEVELOPING COUNTRIES

Anonymous
PAG Bull., 2, No. 2, 11-20 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3637, 727 (Oct. 1972)

The first part of PAG statement 16 on FPC introduces the product and discusses the functions of FPC, particularly in relation to supplementing deficient diets with protein. FPC's have been divided into two groups. Type A products are odourless, bland powders with a very low lipid content and light in colour; utilization is limited to that of protein food additives to increase the nutritional value of other foods. Type B products are flavourful, have a higher lipid content and may be in the form of paste, powder, liquid etc.,; they would be marketed as forms of preserved fish. The quality, safety, organoleptic characteristics and acceptability of FPC, and potential regional supplies of the appropriate fish are discussed. Reprinted

6.54 NON-MEAT PROTEINS FOR FRANKFURTER MANUFACTURING

Smith, G. C., et al.
J. anim. Sci. 35, No. 1, 207-208 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3695, 739 (Oct. 1972)

The effect of soya protein isolates, soya protein concentrates, soya flours, glandless cottonseed meals, fish protein concentrate, non-fat dry milk, and cottonseed protein concentrate upon emulsion stability were studied and the results are briefly reported. (Taken from abstract No. 166 of abstracts of papers for presentation at the 64th Annual Meeting of the American Society of Animal Science.) C.C.E. Reprinted

6.54

isopropanol, and that ethanol was the poorest solvent of the three. Ethanol would require a solvent-to-solids ratio that would be economically prohibitive.
The solvent-to-solid ratio used by the National Marine Fisheries Service in its Experiment and Demonstration Plant [Commercial Fisheries Review 33, No. 2, 22 (1971)] in which fatty fish is used, is 2:1 using five stages plus a slurry mix tank, and using azeotropic isopropanol at a temperature of 80° C.
[5 figures, 3 tables, 13 references] FTP

the resulting profit and return on investment. Problems of allocation of costs and marketing arrangements are not covered in this report, but must be considered in the final decisions relating to a complete evaluation of alternatives.
[6 figures, 6 tables, 7 references] Authors' abstract

6.54 (0.8)

6.54 MAKING FISH PROTEIN CONCENTRATES BY ENZYMATIC HYDROLYSIS. A STATUS REPORT ON RESEARCH AND SOME PROCESSES AND PRODUCTS STUDIED BY NMFS

Hale, Malcolm B. (Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, College Park, MD 20740)
NOAA Technical Report NMFS SSRF-657, v + 32 pp. (Nov. 1972) National Marine Fisheries Service, U.S. Department of Commerce) For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402. Price 50 cents.

Fish protein concentrates (FPC) are products derived from fish by processes in which the fish protein is placed in a more highly concentrated and stable form. As a form of animal protein FPC can supplement vegetable proteins very effectively. Added in low concentrations they can markedly improve the nutritive value of bread and many other common foods by supplying certain essential amino acids in which vegetable proteins are deficient.

FPC may be prepared by various biological, as well as chemical, procedures. Both microbial cultures and isolated enzymes have been used for this purpose. This report summarizes research that has been carried out by the National Marine Fisheries Service (formerly Bureau of Commercial Fisheries) on biological methods for FPC production. The effects of various processing conditions and commercially available proteolytic enzymes on yields and characteristics of water-soluble fish protein hydrolysates are presented.

Soluble FPC prepared from red hake (Urophycis chuss) tended to be deficient in either tryptophan or histidine, depending on the pH of hydrolysis. Hydrolysis

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8.53 ISOMER SUBFRACTIONATION EFFECTS IN THE STUDY OF LONGER CHAIN MONOETHYLENE FATTY ACIDS IN HYDROGENATED OILS

Ackman, R. G., S. N. Hooper, and J. Hingley (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of Chromatographic Science 10, 430-436 (July 1972)

As part of a study of the composition of a pure marine oil hydrogenated for margarine production, a preliminary analysis was performed using silver nitrate-silica gel thin-layer chromatography (TLC) and open-tubular gas-liquid chromatography (GLC). A sample of commercial margarine, purchased retail at random, and labeled 90% marine oil, 10% vegetable oil, was tested.

The TLC of the methyl esters of the margarine fatty acids gave a pattern of four distinct bands of monoethylenic unsaturation. The compositions of the bands were compared by GLC. The four bands were found to be composites, each of the four major chain lengths of marine oils being represented: 16:1, 18:1, 20:1, and 22:1. The longer chain lengths were more concentrated in the most mobile band (22:1).

Fractionation within each band was based on the trans isomers being more mobile than the cis isomers. A further subfractionation of both cis and trans materials was possible because of the greater mobility of isomers with unsaturation closest to the terminal methyl group of the chain. Mobility of these monoethylenic fatty acids also depends on geometry and proportion of methylene groups to the ethylenic double bond.

[9 figures, 4 tables, 29 references] SW

7.42 NEUTRON ACTIVATION ANALYSIS OF MERCURY IN FISH, FLOUR, AND STANDARD REFERENCE ORCHARD LEAVES BY ELECTRODEPOSITION RADIOCHEMISTRY

Heitzman, M. W., and R. E. Simpson (Division of Chemistry and Physics, Food and Drug Administration, Washington, DC 20204)
Journal of the Association of Official Analytical Chemists 55, No. 5, 960-965 (Sept. 1972)

This method for neutron activation analysis of mercury utilizes electrodeposition to isolate the mercury carrier in the recovery step. The recovery of mercury was variable, nevertheless, the results were comparable to those obtained using sulfide precipitation in neutron activation analysis and gas chromatographic techniques. By this method mercury can be detected to parts per billion levels.

[2 figures, 1 table, 6 references] FTP

8.8 (0.8) DETECTION OF FOREIGN BODIES

Preece, Kenneth (Scientific Equipment Group, National Research Development Corp.)
Food Manufacture 47, No. 9, 21-22, 51 (Sept. 1972)

While the problem of contamination of food by unwanted inclusions is of continual concern, most incidents are of a nuisance type rather than a health hazard. Reports indicated that the number of complaints to local authorities has increased each year; for example, over 7,000 in 1967 to over 9,000 in 1970. Complaints of this nature are small compared to total sales.

Electronic metal detectors are useful in many cases but many foreign bodies such as stones, bone, and glass are undetectable by these instruments. Over the past few years the National Research Development Corporation (NRDC) with members of the Food Industry, and BFMIRA, together have made an effort to analyze the need and develop equipment for detection of nonmetallic foreign material in food.

The possibilities examined included the use of X-rays, gamma rays, infrared and visible light, and ultrasonics. The results indicated the most promising of these is soft X-rays with a detector system having a resolution of 1.5 to 2 mm. and signal-processing electronics capable of distinguishing an anomaly against the normal density profile of the product to particles of 1.5-mm. size.

To be economically justifiable a practical system would have to satisfy the following conditions: capital cost not exceeding £5,000; high reliability and minimum attention; cost of replacement components not to exceed £500 per year.

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7.599 (0.35) SIMPLE AND SENSITIVE PROCEDURE FOR DETERMINING NITRATE AND NITRITE IN MIXTURES IN BIOLOGICAL FLUIDS

Wegner, Thomas N. (Dep. Dairy Food Sci., Univ. Arizona, Tucson, Ariz.) Chemical Abstracts 77, No. 7, 45004k (Aug. 14, 1972)

7.42 (9.19) MERCURY CONTENT OF COMMON FOODS DETERMINED BY NEUTRON ACTIVATION ANALYSIS

Tanner, James T., Melvin H. Friedman, and David N. Lincoln (Division of Chemistry and Physics, FDA, Dept. of Health, Education and Welfare, Washington, DC 20204), Leonard A. Ford, and Max Jaffee
Science 177, No. 4054, 1102-1103 (Sept. 22, 1972)

Representative nationwide samples of foods were collected and analyzed for mercury content. Neutron activation analysis was used. The results are shown in the table that follows.

The authors conclude that, with the exception of certain fish, the major foods in the United States are essentially free of mercury. [2 tables, 11 references]

Food sample	Number of samples analyzed	Minimum amount of mercury detectable	Number of samples with below the detection limit of mercury	Mercury content	
				Range [1]	Median [1]
		p.p.b.		p.p.b.	p.p.b.
Flour [2]	28	3	25	<MD-6	<MD
Milk, dry [2]	33	4	13	<MD-27	10
Milk, whole	32	1	23	<MD-9	<MD
Sugar [2]	22	3	17	<MD-10	<MD
Potatoes	33	1	14	<MD-15	3
Beef	23	2	9	<MD-7	3
Chicken	24	1	9	<MD-7	3
Shrimp	32	2	0	5-43	14
Liver	22	2	11	<MD-8	3
Eggs	33	2	30	<MD-5	<MD

[1] <MD = less than the minimum amount of mercury detectable for the particular food.
[2] Not freeze-dried.

FTP

8.8 (0.8)

The main elements of the developed prototype detection system were as follows: (1) an X-ray source operating at 40 kv., 1 kw.; (2) a test aperture capable of accepting products up to 7 in. high and 6 in. wide; (3) a fluorescent screen to receive the X-ray beam; (4) a linear array of 96 photodetectors; (5) a conveyor capable of operating at 120 feet per minute; and (6) signal processing electronics for operating an automatic sorter.

The results of working with the prototype are as follows: (1) in thin, low-density products most of the contaminants could be detected with reasonable certainty; (2) in dense or thick products, contaminants could not be detected; (3) in products of intermediate density only metallic or large nonmetallic inclusions could be detected; and (4) bone or 5-mm.-size particles could not be detected.

The consortium of NRDC, BFMIRA, and others decided not to proceed further with the project, but they are maintaining a watch on the technology in the hope that new techniques or equipment may provide a basis for a successful detector. [1 figure, 1 table, 2 references]

SW

8.8 (2.8)(4.81) CHANGES OF OIL IN A STEAM-OIL FRYING UNIT

Yuzhakova, V. V., and L. M. Shashimova (Kiaiped. Fil., Tsentr. Proekt.-Tekhnol. Byuro, Kiaipeda, U.S.S.R.)
Chemical Abstracts 76, No. 19, 111834p (May 8, 1972)

6.54

of raw fish with an alkaline protease of Bacillus subtilis at pH 8.5 or above gave the best balance of essential amino acids and a high yield of soluble product. Pancreatin also gave very good results at pH 8.5. The protein efficiency ratio (PER) of a totally soluble FPC prepared from alewife (Alosa pseudoharengus) was equivalent to that of casein. Soluble products prepared from hake were equivalent to casein as a wheat supplement but not as a sole source of protein. Process outlines and preliminary cost estimates are presented for the production of two types of fish protein hydrolysates. Possible food uses and the flavor problem are discussed. This report includes a literature survey of fish protein modifications by fermentation and selected chemical hydrolysis methods as well as by enzymatic hydrolysis processes.
[15 figures, 17 tables, 40 references] Reprinted in part

6.54 (6.130) APPARATUS AND METHOD FOR CONTINUOUS EXTRACTION OF FATS FROM ORGANIC MATTER

Osterwann, Sven Olof (Astra Nutrition AB)
U.S. Patent 3,565,634 (Feb. 23, 1971)
Chemical Abstracts 72, No. 13, 86783g (Sept. 25, 1972)

9.12 (0.38) PARTICULATE BIOLUMINESCENCE IN DINOFLAGELLATES: DISSOCIATION AND PARTIAL RECONSTITUTION

Fuller, C. W., Paul Kreiss, and H. H. Seliger (McCollum-Pratt Institute and Dept. of Biology, Johns Hopkins University, Baltimore, MD 21218)
Science 177, No. 4052, 884-885 (Sept. 8, 1972)

V. C. Bode and J. W. Hastings [Arch. Biochem. Biophys. 103, 488 (1963)] described two distinct in vitro bioluminescent systems for the marine dinoflagellate Gonyaulax polyedra. One is a soluble system consisting of the enzyme luciferase, the substrate luciferin, and oxygen; the system requires high salt concentrations and exhibits slow kinetics of light emission. The other is a particulate system; it emits a single flash as the result of an increase in hydrogen ion concentration.

With the same extraction conditions used for G. polyedra, the authors isolated soluble and particulate bioluminescence from Pyrodinium bahamense and Pyrocystis lunula. They were able to dissociate soluble luciferin and luciferase from the particulate system.

The results do not resolve the question of whether the in vivo luminescence is due to soluble or particulate components. However, this finding in additional species of particulate systems that are labile, contain dissociable luciferase and luciferin, and can be made to recycle by the addition of luciferin, tends to strengthen the belief that the particulate system is the physiological one. [2 tables, 12 references]

FTP

9.15 ACUTE TOXICITY OF SPENT SULPHITE LIQUOR TO ATLANTIC SALMON (SALMO SALAR)

Wilson, R. C. H. (Dept. of the Environment, Environmental Protection Service, P.O. Box 5667, St. John's Newfoundland, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1225-1228 (Aug. 1972)

The major method of paper production in eastern North America is the sulfite pulping process. Pulp mills are usually located near a body of water and often dump their effluent into that water. The discharge of spent sulfite liquor (SSL) into the water causes turbidity at first, then oxygen depletion. In addition, a quantity of hydrogen ions is also introduced into the water making it acidic.

Static bioassays of 96-hr. duration were performed to determine SSL toxicity to Atlantic salmon (Salmo salar) parr. Four static bioassays were performed. Three used fresh SSL, while the fourth used oxidized SSL.

As the concentration of SSL increased above 475 parts per million (p.p.m.), the dorsal part of the fish darkened, which masked the parr marks. At an SSL concentration of over 1,000 p.p.m., loss of reaction to sudden, external movement was observed followed by rapid and irregular breathing. At the higher concentrations (above 2,500 p.p.m.), fin edges became white and extremely brittle. Death was preceded by loss of orientation, immobility, very rapid breathing and, finally, spasms.

Fish exposed to oxidized SSL had a higher LC50 (level at which 50% of the test fish would survive), and responded differently to the concentration of SSL than those fish exposed to fresh SSL. The higher LC50 is presumably due to alteration of the levels of one or more toxic components in the oxidized SSL. A higher

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9.16 (1.85) DEVELOPMENTS IN THE LABORATORY CULTURE OF THE COMMON PRAWN, PALAEMON SERRATUS (PENNANT)

Wickins, John F. (Fisheries Experiment Station, Ministry of Agriculture, Fisheries and Food, Conway, England)
Fishery Investigations Series II, 27, No. 4, v + 23 pp. (1972) (Ministry of Agriculture, Fisheries and Food, London, England) Her Majesty's Stationery Office. 76 p

These studies indicate the possibility of commercial prawn culture in the United Kingdom. The prawn P. serratus (P.) was cultured through four generations in captivity. The mean generation time was 8 months. Larvae grew equally well for most of the year in either natural or filtered sea water which was renewed at 3-day intervals. Mixtures of antibiotics to cultures slightly retarded growth of the larvae, which were otherwise unaffected. Continual illumination of larvae gave best results.

Good food for larvae were newly hatched nauplii of Artemia salina (L.) from Saskatchewan and San Francisco. The larvae completed their development more rapildy when cultured with Artemia in the presence of the alga Isochrysis galbana.

During the mass culture of larvae, 50,000 postlarvae were reared with a mean survival of 27%. Postlarvae grew well when food was available 16 hr. per day.

The most efficient production in terms of weight of prawns produced per gram of prawns stocked per square meter of tank floor area was obtained in tanks containing 350 prawns per square meter. These yielded, after 3 months, 14.45 grams per gram of prawn stocked per square meter.

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9.15 ACUTE AND CHRONIC TOXICITY OF CADMIUM TO THE FATHEAD MINNOW (PIMEPHALES PROMELAS)

Pickering, Quentin H., and Marion H. Gast (U.S. Environmental Protection Agency, National Water Quality Laboratory, Cincinnati, OH 45244)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1099-1106 (Aug. 1972)

Cadmium occurs in small quantities in natural water and in large quantities in water receiving industrial wastes. Although cadmium pollution is not critical at the present time, its pollution potential is high due to its high toxicity and long biological half-life.

Two continuous-flow bioassays were conducted to determine cadmium toxicity to the fathead minnow (P. promelas). The second test came 2 years later to evaluate the precision and repeatability of chronic bioassays.

Two chronic tests were conducted along with acute tests. The first chronic test was performed with adult fish obtained from a local fish farm. The second chronic test was performed with their 3-week-old fry. The acute tests were composed of two 96-hr. static bioassays and five continuous-flow bioassays.

Chronic test one resulted in a slow, cumulative mortality at the two highest concentrations and no mortality in the three lowest concentrations and control fish. Results for chronic test two were similar to chronic test one, except that survival at the lower concentrations was similar to control fish survival (approximately 70%). Other results indicated that the lower cadmium concentrations had no significant effect on egg hatchability, growth of adults and fry, and egg production. High cadmium concentrations had an adverse effect on embryo circulatory

(over)

9.16 EXPERIMENTAL STUDIES OF POLYCULTURE IN 1971

Yashouv, A., and A. Halevy (Fish Culture Research Station, Dor, Israel)
Bamidgeh 24, No. 2, 31-39 (June 1972)

Reports of other work on polyculture showed the benefits derived from maintaining carp, silver carp, and tilapia together in the same pond. Excessive algal bloom in the surface layer absorbed the efficient sunlight thus photosynthesis decreased in the water layers below. Primary production of phytoplankton 30 cm. below the surface was inhibited by the reduced amount of sunlight available at that depth. Silver carp feed on algae and other phytoplankton. They consumed the algae on the surface, which caused increased production of phytoplankton at the lower depths. Carp browsing at the bottom stir up organic matter which is suspended in the water and ingested by the silver carp. The tilapias prevent conditions of oxygen depletion by removing organic matter from the bottom and allow for development of food animals which are consumed by the carps.

Experiments were carried out on polyculture of carp, silver carp, and tilapias under fertilization with and without supplementary feedings. Fertilization without supplementary feedings consisted of adding to two ponds--60 kg. of ammonium sulfate and 60 kg. superphosphate per hectare biweekly and in alternate weeks 60 kg. of poultry droppings. Two other ponds received the same amounts of fertilizer weekly.

Total yields after 187 days' growth reached 2,352 kg./ha. in ponds with biweekly fertilization and 2,986 kg./ha. in ponds with weekly fertilization. Weekly

(over)

9.15

systems, inhibiting red blood cell circulation. The results showed that the maximum acceptable toxicant concentration is between 57 and 37 µg. Cd/liter. These figures were supported by the results of chronic test two, indicating high reproducibility of chronic tests. [6 tables, 23 references]

Lee Thorson

9.15 METHODOLOGY FOR STUDYING THE POISONING OF FISH

Kanaev, A. I., and V. V. Metelev (Vses. Inst. Eksp. Vet., Moscow, U.S.S.R.)
Chemical Abstracts 77, No. 9, 57195m (Aug. 28, 1972)

9.16

fertilization increased the carp yield 33.3% and the silver carp yield by 29.7%. The effect on tilapia growth was minimal.

In experiments with fertilization and supplementary feedings six ponds received weekly fertilization and pellets containing 25% protein. The daily ration of pellets was 4% of the carp biomass plus 2% of the tilapia biomass. Results indicated that fertilization and supplementary feeding increased carp yields fourfold and tilapia yield sevenfold. Silver carp yield did not respond to supplementary feeding.

The authors believe that the addition of tilapia to the polyculture caused increased growth increments of the carp and silver carp; furthermore, the results indicate the advantage of polyculture of these three fishes.

[4 tables, 5 references]

SW

9.15 SENSITIVE INDEXES AND CHANGES IN THE SYSTEMS OF FISH DURING POISONING

Krylov, O. N. (Gos. Nauchno-Issled. Inst. Ozern. Rechn. Rybn. Khoz., Leningrad, U.S.S.R.)
Chemical Abstracts 77, No. 9, 5724,e (Aug. 28, 1972)

9.16 (1.85)

Cannibalism was the greatest single cause of mortality in captive prawns; it was reduced by increasing the effective floor area of a tank. The increased area was achieved by providing a stack of black PVC sheets spaced about 5 cm. apart mounted horizontally on a wooden frame. More prawns used the sheets for resting than used the floor thereby increasing the effective floor area.

When the experiment ended the prawns were 15 months old and had more than doubled their weight in the previous 4 months.

[9 figures, 12 tables, 17 references, 2 plates]

SW

9.15 (9.19) TOXICITY OF MERCURY OF PHYTOPLANKTON

Nuzzi, Robert (New York Ocean Sci. Lab., Montauk, N.Y.)
Chemical Abstracts 77, No. 9, 5726f (Aug. 28, 1972)

9.15

concentration of oxidized SSL was needed to kill the same percentage of fish in an equal amount of time than that of fresh SSL.

These results for 96-hr. LC50's on Atlantic salmon parr are similar to those obtained for Pacific salmon. However, 30-day continuous flow bioassays on Pacific salmon gave much lower LC50's than the 96-hr. assays. Therefore, application of these results on sulfite pulpmill wastes to field situations should be made with caution. [3 figures, 2 tables, 12 references]

Lee Thorson

9.12 (1.70) SHARK-TAGGING: KEEPING TRACK OF ONE OF WORLD'S GREAT SURVIVORS

Holden, Constance
Science 177, No. 4050, 681-682 (Aug. 25, 1972)

This article describes an expedition aboard the fishing boat Dorothy T. into Delaware Bay to attach tags to sandbar and sand tiger sharks. Although industrial pollution has reduced the numbers of certain fish and shellfish in Delaware Bay, sharks are plentiful. This tagging operation was part of the program of the American Littoral Society, Sandy Hook, N.J. The organization was established in 1961 as a conservation and information organization for those interested in fish and in preserving the ecology of coastal areas. It publishes the bulletin Underwater Naturalist.

FTP

9.16 (1.37) EFFECTS OF METABOLIC PRODUCTS ON THE QUALITY OF RAINBOW TROUT

Smith, Charlie E. (Fish Cultural Development Center, Bureau of Sport Fisheries and Wildlife, Bozeman, MT 59715)
American Fishes and U.S. Trout News 17, No. 3, 7-8, 21 (Sept.-Oct. 1972)

Fish reared in hatcheries under crowded conditions and reused water are exposed to elevated concentrations of accumulated excretory products. These end products of metabolism are detrimental to the growth of fish.

In other work ammonia and urea were reported to be the only dissolved excretory products found in measurable amounts in water of salmonid hatcheries. Furthermore, urea had no detrimental effect on gill tissue but un-ionized ammonia was found to be toxic. Results of a short-term experiment of 6 weeks indicated that growth of trout was not affected by toxic concentrations of 0.8 to 1.0 p.p.m. of ammonium hydroxide when the oxygen level was maintained at 7.0 to 8.0 p.p.m.

In experiments conducted over a 12-month period ammonia content was held to a level of 0.5 p.p.m. for controls, and test fish were exposed to concentrations of 1.0 to 1.5 p.p.m. as total ammonia. The pH of the water was at 7.75 plus or minus 1, and the temperature was maintained at 50° F.

Results indicated that growth of trout was not affected after 4 months exposure to 1.2 and 1.6 p.p.m. ammonia. Oxygen concentrations were 5.80 to 7.45 p.p.m. There was a reduction in weight of fish exposed to 1.6 p.p.m. after 6 and 12 months. After 6, 9, and 12 months some fish reared in the highest ammonia environment were emaciated and lethargic. Microscopic examination of gill and liver tissues showed severe pathological changes.

(over)

9.16 (1.85) EFFECT OF FISH REMOVAL ON THE GROWTH AND CONDITION OF WHITE SHRIMP, PENAEUS SETIFERUS (LINNAEUS), IN BRACKISH PONDS

Parker, Jack C., Hoyt W. Holcomb, Jr., Wallace G. Klussmann (Texas Agricultural Extension Service, Dept. of Wildlife and Fisheries Sciences, Texas A & M University, College Station, TX 77840), and James C. McNeill, IV (Brazoria County Mosquito Control District, Angleton, Tex.)
Texas A & M University Sea Grant Program, Report TAMU-SG-72-701, ii + 12 pp. (June 1972) (College Station, TX 77840) No price

Previous work reported that a pond from which predacious fish had been removed yielded almost twice the return of shrimp as a pond where predators were allowed.

The effect on growth and condition of juvenile white shrimp was examined in relation to absence or presence of fish. A 1.0-hectare (ha.) pond was treated with a rotenone compound (Chem Fish Collector) at a rate of 1 p.p.m. The species that were found dead were menhaden, worm eel, sheepshead minnow, Gulf killifish, sailfin molly, spot, striped mullet, and tidewater silversides. These species were abundant in a 0.5-ha. pond. Juvenile white shrimp were stocked in both ponds at a rate of 50,000 per ha. and fed a supplemental pelleted ration 3 days per week at a rate of 10% of their estimated total weight.

After 77 days, shrimp in the treated pond averaged 12.3 mm. longer and 4.0 g. heavier than those in the pond with fish. Seine samples indicated that abundance of shrimp had declined in the pond containing fish. Condition of the shrimp in the treated pond was better than those in the untreated pond. This difference was

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9.19 PHTHALIC ACID ESTERS: BIOLOGICAL IMPACT UNCERTAIN

Marx, Jean L.
Science 178, No. 4056, 46-47 (Oct. 6, 1972)

In 1972, about 1 billion pounds of phthalic acid esters were used in industry, in the home, and in medical science. Most of the phthalates are used as plasticizers to impart the desired flexibility and workability to plastics (usually polyvinyl chloride). Evidence indicates that the phthalates may have become general environmental contaminants. In September 1972, the National Institute of Environmental Health Sciences, Research Triangle Park, N.C., sponsored a conference to assess the current state of knowledge concerning the phthalic acid esters. The proceedings of the conference will be published in the January 1973 issue of the new journal Environmental Health Perspectives. The present article reports some comments at the conference relative to the biological significance of the esters in the environment.

Researchers reported phthalate levels from 1 to 2 p.p.b. in two rivers in Boston and as high as 0.6 p.p.b. in the Mississippi River. Phthalates were also found in air samples.

Quantitative information on the origin of phthalates in the environment is not known. Pesticides contain phthalate carriers and may release the compounds directly into the soil, water, and air. Also phthalates may be leached into the environment from polyvinyl chloride. Some bacteria, fungi, and plants are able to synthesize phthalates.

Although some scientists believe that the phthalates are relatively biodegradable, most consider the evidence for biodegradability inconclusive.

(over)

9.19 POLYCHLORINATED BIPHENYL RESIDUES: ACCUMULATION IN CAYUGA LAKE TROUT WITH AGE

Bache, Carl A. (Pesticide Residue Laboratory, Cornell University, Ithaca, NY 14850), James W. Serum, William D. Youngs, and Donald J. List
Science 177, No. 4055, 1191-1192 (Sept. 29, 1972)

The levels of polychlorinated biphenyls (PCBs) were determined in lake trout from Cayuga Lake in Ithaca, N.Y. The compounds were determined by column chromatographic isolation, specific detector gas chromatography, and mass spectrometry. The ages of the fish were also recorded; this information was available because the fish in the lake are stocked annually as yearlings.

The level of PCBs in the lake trout (whole fish) varied directly with the age of the fish. The following table (a consolidation of the original) shows the levels of PCBs in the lake trout as a function of the age of the fish.

[2 figures, 1 table, 8 references]

Age of lake trout	Number of fish samples	Range of contents of PCBs in the whole fish
years		p.p.m.
1	4	0.5 - 1.6
2	3	1.3 - 2.5
3	3	1.2 - 2.4
4	3	3.5 - 5.1
5	1	5.7
6	3	3.4 - 9.7
7	2	4.0 - 10.5
8	3	4.5 - 17.5
9	1	30.4
11	1	12.4
12	3	7.4 - 26.2

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9.16

probably due to the seed stock in each pond coming from different bay populations The authors suggested that the predacious fish not only reduced the numbers of shrimp, but also competed with them for food and depressed their growth rate.
[4 figures, 1 table, 3 references] SW

9.16 (1.81) SETTLEMENT OF OSTREA EDULIS (L.), IN RELATION TO THE CULTIVATION OF OYSTER GROUNDS

Waugh, G. D. (Marine Dept., Wellington, New Zealand)
Fishery Investigations Series II, 27, No. 2, v + 34 pp. (1972) (Ministry of Agriculture, Fisheries and Food, London, England) Her Majesty's Stationery Office. 95p

Experiments designed to evaluate the merits of harrowing oyster grounds or relaying shell on them to increase the catch of settled oyster spat were performed.

Results indicated that the relaying of shell caused an increase in the numbers of spat per unit area of bottom. Harrowing did not result in an increase; furthermore, it had a long-term adverse effect on the growth of the oysters damaged by the harrows. In the relaying of shell the author suggested that care must be taken to avoid introducing predators if the shell is freshly dredged.

Of the various types of shell used in relaying, Ostrea edulis, Chlamys varia, and Mytilus edulis were equally suitable for spat attachment. The shells of M. edulis were the most useful because they are more friable and the spat on them can be separated more readily.

Examination of the spat on the shells and their general distribution in relation to the numbers of shells available has shown evidence of aggregation of spat that is attributed to gregarious settlement. Another explanation for the aggregation of spat is the corresponding aggregation of planktonic larvae. In studies of spat in the River Fal it was found that, in general, there was a positive relation between abundance and variety of sedentary forms of fouling organisms and the abundance of settled spat.

Limited observations on spat survival indicated that postsettlement mortality is of the order of 93% after 12 months.
[8 figures, 15 tables, 40 references] SW

9.17 (1.87) ENHANCEMENT OF LOBSTER GROWTH

Hughes, John T., and John J. Sullivan (Massachusetts Dept. of Natural Resources, Division of Marine Fisheries, Lobster Hatchery and Research Station, Vineyard Haven, MA 02568), and Robert Shleser
Science 177, No. 4054, 1110-1111 (Sept. 22, 1972)

Lobsters raised in warm (22° to 24° C.) sea water grew at least four times as fast as they would normally in the wild (at ambient ocean temperatures). Selected captive lobsters were successfully mated at the Massachusetts Lobster Hatchery. The progeny reached sexual maturity (about 454 grams) in less than 2 years; it takes about 8 years at ambient ocean temperatures in the wild. By selecting the fast-growing lobsters, it may be possible to produce marketable size lobsters in about 18 months. These results (the successful mating of selected parents and acceleration of growth of lobsters) suggest that lobster farming may be possible.
[4 figures, 4 references] FTP

9.16 (1.37)

At the end of 9½ months there was no increase in mortality; however, after 12 months exposure to 1.6 p.p.m. ammonia a bacterial gill disease resulted in severe mortality in one tank.

The results indicated that if oxygen levels were maintained at 5.0 p.p.m. growth of trout was not affected until ammonia concentrations reached 1.6 p.p.m. (0.033 p.p.m. unionized ammonia) and after 6 months' exposure. The author suggests that trout may be maintained in environments that have more than the recommended 0.1 p.p.m. of ammonia with no detrimental effects.
[4 tables, 6 references] SW

9.19

Researchers have found di-n-butyl phthalate (DNBP) and di-2-ethylhexyl phthalate (DEHP) in specimens of fish, crustaceans, and water collected throughout North America. Further, it was shown that the marine species could concentrate DNBP and DEHP from water containing about 1 to 2 p.p.b. of the chemicals; after 7 days the organisms contained from 350 to 3,900 times that in the water. The implication is that DNBP and DEHP can accumulate in the food chain.

Most of the participants at the conference agreed that the phthalic acid esters do not appear to pose an imminent threat to human health. On the other hand, the phthalates are widely distributed in the environment and the question has been raised about the subtle effects of persistent exposure to very low concentrations of the chemicals.

A review entitled "Toxicity and health threats of phthalate esters: Review of the literature" by J. Autian [Oak Ridge National Laboratory, Oak Ridge, Tenn. (1972)] is available from the National Technical Information Service, U.S. Department of Commerce, Springfield, Va.
[2 references] FTP

9.19 THE PURIFICATION OF EFFLUENT IN THE MEAT AND FISH INDUSTRY

Baldacci, P., A. Canuti, and G. Coppiardi
Industrie alimentari 11, No. 2, 51-58 (1972) (In Italian)
BFMIRA Abstracts 25, No. 10, Abstract No. 3749, 750 (Oct. 1972)

Discussion and review with 28 references. C.C. Reprinted

9.19 WASTE CONTROL CAN BE COSTLY -- PLAN CAREFULLY

Brown, W. L.
Nat. Provis. 166, No. 23, 114-119 (1972)
BFMIRA Abstracts 25, No. 10, Abstract No. 3777, 755 (Oct. 1972)

Some of the outlets for utilizations of animal by-products are briefly described as well as some methods of waste treatment. The costs quoted are for the US meat industry. (From a paper read at the 31st meeting of the National Independent Meat Packers Association, 11-13th May 1972, Chicago.) C.C.E. Reprinted

9.19 MICROBIAL POPULATION OF FEEDLOT WASTE AND ASSOCIATED SITES
(0.5)

Rhodes, R. A., and G. R. Hrubant (Northern Regional Research Laboratory, Northern Marketing and Nutrition Research Division, ARS, U.S. Department of Agriculture, Peoria, IL 61604)
Applied Microbiology 24, No. 3, 369-377 (Sept. 1972)

Livestock wastes present a major problem from the standpoint of disposal and inherent pollution hazard. As part of a study on the utilization of feedlot waste (FLW), the authors examined the microbiological flora of feedlot wastes and associated sites. Quantitative microbiological determinations were made bimonthly for a year of the flora of beef cattle waste and runoff at a medium-sized midwestern feedlot.

The feedlot waste contained (per gram of dry weight) 10^{10} total organisms, 10^{9} anaerobes, 10^{8} gram-negative bacteria, 10^{7} coliforms, 10^{6} sporeformers, and 10^{5} yeasts, fungi, and streptomycetes. The numbers and patterns of the groups of organisms varied slightly over the year in spite of a wide variation in weather. Little microbial growth occurs in the waste as it exists in the feedlot. The runoff from the pens showed the same microbial population pattern. Apparently the fungi, especially streptomycetes, are associated with final stabilization of the waste. Although yeasts are the dominant organisms in the ensiled corn fed the cattle, they do not occur in large numbers in the animal waste. Water from large ditches receiving runoff and subsurface water from the fields had a microbial population similar to the runoff but showed lower level of coliforms.

(over)

9.19 ENTEROBACTERIA IN FEEDLOT WASTE AND RUNOFF
(0.5)

Hrubant, G. R., R. V. Daugherty, and R. A. Rhodes (Northern Regional Research Laboratory, ARS, U.S. Department of Agriculture, Peoria, IL 61604)
Applied Microbiology 24, No. 3, 378-383 (Sept. 1972)

The waste and runoff from cattle feedlots may represent a serious pollution hazard. Furthermore, refeeding of wastes is being studied as a means of disposing of the increasing accumulation of waste from intensive animal production. In another report in the same issue of this journal [Appl. Microbiol. 24, No. 3, 369-377 (1972)] R. A. Rhodes and G. R. Hrubant enumerated and categorized the microflora of FLW (feed lot waste). In the present study, FLW and runoff were examined for Enterobacteriaceae. In addition to samples of FLW and runoff from the pens, samples of water from a large drainage ditch at the feedlot were examined. The drainage ditch received the runoff but contained primarily subsurface drainage from fields on which FLW was spread for disposal.

Five hundred and fifty-three cultures of enterobacteria were isolated by plating and enrichment techniques employing seven different media.

The FLW samples contained about 50 million enterobacteria per gram dry weight, 90% of which were Escherichia coli (nonenteropathogenic types). Citrobacter spp. and Enterobacter cloacae were present in moderate amounts. Enterobacter aerogenes, Klebsiella, Providencia stuartii, Arizona, four species of Proteus, and Salmonella (serological group C_2) were also isolated. No Shigella were found. The same bacterial pattern was found in the runoff and the drainage ditch

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9.2 COSTS AND EARNINGS OF TUNA VESSELS IN HAWAII
(1.12)

Ahsan, Abu Ekram, John L. Ball, Jr., and Jack R. Davidson (University of Hawaii) University of Hawaii Sea Grant Program Report AR-72-01, NOAA Grant No. 2-35243, 22 pp. (July 1972). No price.

Of Hawaii's fisheries the high-sea or pelagic fishery is mainly directed to catching tuna which is the most significant component of the Hawaiian fishing industry. The tuna fishery is divided into pole and line fishing for skipjack tuna (called "aku") and longline fishing for other tuna (called "ahi"), for example yellowfin, big eye, and albacore.

For aku and ahi fisheries, boats were grouped into three categories--high, average, and low earning--on the basis of their gross earnings. The amount of fishing effort accounted for most of the differences in income among the three groups.

Ths costs of fishing were divided into two categories: (1) average annual expenses (AAE); and (2) operating expenses (OE). These expenses for each type of boat are listed in the following table.

Boat	High earning (HE)		Average earning (AE)		Low earning (LE)	
	AAE	OE	AAE	OE	AAE	OE
Aku	$36,571	$19,461	$20,867	$16,815	$19,210	$14,242
Ahi	$10,943	$18,295	$ 9,123	$14,357	$ 7,824	$ 8,968

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9.3 EMERGING LAW OF THE SEA: ISSUES IN THE MARIANA ISLANDS

Nordquist, Myron H. (U.S. Dept. of State, Ocean Affairs Section, Washington, D.C.) and Amanda Lee Moore (National Law Center, George Washington University, Washington, DC 20006)
Journal of International Law and Economics 7, No. 1, 43-59 (June 1972) (National Law Center, George Washington University, Washington, DC 20006)

The Congress of Micronesia passed on 20 February 1972 an exclusive fishing zone law. The law was modeled on legislation of the United States, and it essentially seeks to establish a 9-mile exclusive fisheries zone contiguous to a 3-mile territorial sea. As distant water fishing techniques and deepwater mineral exploration capabilities advance, increasing pressures can be expected for greater control over offshore resources near islands. The number of islands, inlets, reefs, and semisubmerged geographical features located throughout the world is vast; if each were accorded a territorial sea and ocean resource entitlement on the same basis as if it were a continent, the worldwide implications would be staggering. The objectives of this article were: (1) to describe the legal status, governmental organization, geography, and economy of the Trust Territory of the Pacific, particularly the Mariana Islands; and (2) to present the general legal arrangements for the Trust Territories and then to examine several law-of-the-sea issues as they relate to the unique circumstances of the Mariana Islands.

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9.19 (0.5)

water but there were fewer enterobacteria. No Salmonella or Arizona were found in the runoff and drainage ditch water.

The authors conclude that feedlot wastes do have public health significance. [6 tables, 12 references] FTP

9.19 ATMOSPHERIC CARBON DIOXIDE: ITS ROLE IN MAINTAINING PHYTOPLANKTON STANDING CROPS

Schindler, D. W., and G. J. Brunskill (Freshwater Institute of the Fisheries Research Board of Canada, 501 University Crescent, Winnipeg 19, Manitoba, R3T 2N6, Canada), S. Emerson, W. S. Broecker, and T.-H. Peng
Science 177, No. 4055, 1192-1194 (Sept. 29, 1972)

The atmosphere is considered by some to be an insignificant source of carbon dioxide for the production of phytoplankton. The present workers found, however, that by adding phosphorus (as Na_2HPO_4) and nitrogen (as $NaNO_3$) to a small lake having low concentrations of natural dissolved inorganic carbon, the phytoplankton standing crop was increased by two orders of magnitude. The artificially enriched lake appeared to have obtained the carbon necessary to produce algal bloom from the atmosphere. The authors conclude that the invasion of CO_2 from the atmosphere is likely to be sufficient for the eutrophication of any lake receiving sufficient supplies of nitrogen and phosphorus.
[1 figure, 1 table, 14 references] FTP

9.19 IMPROVEMENTS IN OR RELATING TO THE PROCESSING OF ANIMAL MATERIAL COMPOSITIONS

Stord Bartz Industri A/S (Norway) (pat.)
British Patent 1,286,778
BFMIRA Abstracts 25, No. 10, Abstract No. 3858, 771 (Oct. 1972)

Apparatus for the sterilization and evaporation of the water content of butchers' offal, meat, feathers, blood, and fish waste is described. Reprinted

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9.3

If residents of the Mariana Islands are to look to the sea for supplementary supplies of natural resources, it would be highly desirable to ascertain the present state of the law that would govern any offshore exploitation activity. The authors reviewed relevant U.S. legislation and treaties that would be applicable to the circumstances of the Trust Territories.

For example, it appears that the (United States) Submerged Lands Act and the Outer Continental Lands Act statutes do not apply to the Trust Territories. Both of these laws refer to the State boundary for the commencement of their regulation; the statutes define this as the State of the Union, thus excludes the Trust Territory. Also, the Convention on the Continental Lands confers sovereign rights over the natural resources of the Continental Shelf adjacent to the coastal states, but this multilateral treaty has not been interpreted as being applicable to the Trust Territories. Further, there appears to be a potentially important difference between the Trust Territory Code definition of the breadth of territorial waters and Article II of the Convention on the Territorial Sea and the Contiguous Zone. The Trust Territory Code permits a more generous recognition of basepoints than does the Convention.

Apparently the midoceanic islands have generated many issues for the law-of-the-sea conference in 1973.
[78 footnotes] FTP

9.19 (0.5)

Future reports on this study will deal with the characterization of representative isolates of all groups of microorganisms in terms of their possible disposal or utilization of FLW.
[4 figures, 1 table, 14 references] FTP

9.2 (1.12)

Average annual expenses are higher for aku boats than for ahi boats and are due to differences in costs of repair and maintenance. In operating expenses, the highest cost item in the aku boats was for fuel and oil; the highest cost item for ahi boats was for bait.

The aku owners' average annual income (before taxes) was $20,691 for HE boats, $9,258 for AE boats, and $4,269 for LE boats. These figures represent about 21.6%, 9.8%, and 4.6%, respectively, of the estimated current replacement cost of a similar boat (excluding equipment). For ahi boat owners, the average annual income (before taxes) was much lower than for aku boat owners. The estimated hourly earning of aku fishermen for the three earning groups was $1.71. For ahi fishermen the average annual income was $4,422, $3,548, and $1,837 for HE, AE, and LE boats, respectively. These earnings are much lower than wages in other industries and discourage employment. The low earnings of ahi boat owners and fishermen appear to be the major factors restricting this industry.

There are a number of State and Federal loan programs designed to encourage investment in the fishing industry. Only two owners obtained loans from the State program for constructing new vessels, and only three persons obtained loans under the Federal programs. Restrictive prerequisites in the past, the high risks involved in the tuna fishery, and the low earnings of most of the boats have discouraged fishermen from long-term investment in boats and equipment.

Most of the tuna boats are more than 20 years old, which detrimentally affects range, efficiency, and fishing effort--the prime variables in determining income and return on investment. Growth in the tuna industry depends upon introduction of new boats which will increase productivity and give better returns on investment. [2 figures, 14 tables, 14 references] SW

9.19 MICROBIAL DEGRADATION OF CRUDE OIL: FACTORS AFFECTING THE DISPERSION IN SEA WATER BY MIXED AND PURE CULTURES

Reisfeld, Abraham, Eugene Rosenberg, and David Gutnick (Dept. of Microbiology, Tel Aviv University, Tel Aviv, Israel)
Applied Microbiology 24, No. 3, 363-368 (Sept. 1972)

During the course of a study of the factors which influence the kinetics of microbial dispersion of crude oil in sea water, a pure culture (one of eight isolated) capable of bringing about a rapid dispersion and extensive degradation of oil was isolated. The dispersion of crude oil by this bacterium (a member of the genus Arthrobacter) was dependent upon sources of exogenous nitrogen and phosphorus and was completely inhibited by 10^{-2} M azide. Acidic conditions were not necessary for oil dispersion. When sea water was supplemented with 0.029 mM K_2HPO_4 and 3.8 mM $(NH_4)_2SO_4$ and inoculated with the organism, oil dispersion occurred within 1 day. The strict requirement for nitrogen and phosphorus supplementation suggests that the use of microorganisms in the treatment of oil pollution must be limited to situations in which the polluting oil is confined.
[4 figures, 4 tables, 14 references] FTP

9.3 CANADIAN CLAIMS IN ARCTIC WATERS

Dellapenna, Joseph W. (Law Department, Willamette University, Salem, Ore.)
Land and Water Law Review 7, No. 2, 343-420 (1972) (College of Law, University of Wyoming, Laramie, WY 82070)

In this article, the author analyzes various theories of international law which might reconcile the conflicting interests of Canada and other nations in Arctic waters. These interests involve aspirations to exploit the Arctic waters either for their natural resources or for navigation. The author concludes that, to date, Canada's asserted claims in Arctic waters have been too broad, and further he indicates that there are other more limited methods of protecting legitimate Canadian interests. The sections of the article deal with: I. The Canadian Arctic; II. The Competing Interests; III. Alternative Solutions (A. International Regulation of Arctic Pollution, B. The Marginal Belt, C. Historic Waters, D. Contiguous Zones, E. Straight Baselines, and F. Sectors); and IV. Conclusion. The author believes that a system of straight baseline running along the outer edges of the Canadian mainland and islands as limited by the Convention of the Territorial Sea would be a more reasonable, but still effective, solution to the Canadian anxiety over the Arctic environment and control of their national sea route. [201 footnotes] FTP

9.19 LEAD CONTENT OF HUMAN HAIR (1871-1971)

Weiss, D., B. Whitten, and D. Leddy (Michigan Technological University, Houghton, MI 49931)
Science 178, No. 4056, 69-70 (Oct. 6, 1972)

Atmospheric levels of lead have risen steadily since 1940 [D. Jenkins, Smithsonian 3, 62 (1972)]. Quantative data on the effect of lead on the population prior to the introduction of tetraethyl lead into gasoline in 1923 are not available. The present article reports on the analysis for lead of antique hair (removed from persons between 1871 and 1923) and contemporary hair (from rural and urban populations in 1971). They found that the lead content per unit weight of hair was significantly higher in the antique population than in present day populations. Apparently, the lead content of human hair has decreased between the period 1871-1923 and 1971 in spite of an increase in the level of lead in the atmosphere.
[2 tables, 13 references] FTP

9.3 INTERNATIONAL CONTROL OF RIVER WATER POLLUTION

Witaschek, Fred V.
Denver Journal of International Law and Policy 2, No. 1, 35-54 (Spring 1972) (University of Denver College of Law, Denver, CO 80210)

The author presents some technical and administrative suggestions for controlling the pollution of international rivers. He believes that current technological developments will enable the doctrine of equitable utilization to be more accurately implemented. And, he concludes that once technology demonstrates the capability of coping with pollution, criticism of administration will be replaced by active support.
[29 footnotes] FTP

9.3 THE PREPARATION OF ARTICLE 1 OF THE CONVENTION ON THE CONTINENTAL SHELF

Oxman, Bernard H.
Journal of Maritime Law and Commerce 3, No. 3, 445-472 (Apr. 1972)

This is the second of three parts of a study on the subject by the author and deals with the Ciudad Trujillo Conference; part 1 appeared in the January issue of this journal. [57 footnotes] FTP

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